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ABSTRACT

This guide is designed to aid the development of vocational education programs in agriculture in local school districts. Major program objectives, conditions conducive to learning, program evaluation, suggestions for using the guide, curriculum models, and Wisconsin's philosophy and procedures in developing occupational experience programs in vocational agriculture are discussed in the introduction. Over sixty vocational agriculture instructional units are described including agribusiness accounting, animal nutrition, choosing a career, conservation, farm management, floriculture, landscaping, meat processing, pollution, supervised occupational experience programs and records, and tobacco production. Each unit description contains the following elements: performance objectives, concepts to develop, subject matter to teach, motivation, learning activities, and materials needed. A directory of publishers of vocational agriculture instructional materials is appended. (LRA)

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CURRICULUM GUIDE FOR INSTRUCTION IN WISCONSIN HIGH SCHOOLS

1981 Revision
by
Curriculum Study Committee
Wisconsin Association of Vocational Agricultural Instructors

in cooperation with the
Agricultural Education Staff
of
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FOREWORD

The Curriculum in Vocational Agriculture/Agribusiness Occupations must be constantly adjusted to the changes that are taking place in the broad field of agriculture.

A course of study developed on the state level can only be suggestive insofar as any individual instructor's local program is concerned. This course of study *must* be adapted to fit the needs of the individual student and the community in which he resides.

This course of study was completed through the combined efforts of more than one hundred agriculture instructors, the teacher training staffs, and the agriculture supervisors on the state staffs. Part of the funding was provided through the Vocational Education Amendments of 1976.

The present revision (1980) is a continuing effort to develop and maintain a course of study that is flexible, relevant, and up to date. Our recommendation is to make necessary adjustments in this course of study to meet your local needs. It is important the agriculture instructor understands the purpose of this course of study is to assist him and not a mandate of what must be taught.

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PHILOSOPHY

Vocational education programs in agriculture/agribusiness should be designed for and available to all students who express a genuine interest in any occupation requiring knowledge and skill in agriculture/agribusiness. In this context, agriculture includes occupations in the major areas of: 1) Production Agriculture, 2) Providing inputs and services to production agriculture, 3) Processing and marketing the products of agriculture, 4) Developing and conserving agricultural resources, and 5) Professional careers in agriculture.

To serve an increasingly diversified clientele, a vocational education program in agriculture/agribusiness must provide flexibility in a wide variety of settings. Essential to this program is the principle of "Learning by doing." A variety of methods can be used to provide practical experience in the classroom, laboratory, on the farm, or in various agricultural businesses and industries.

A committee of WAVAI has prepared the following document to serve as a guide for the development of a vocational education program in agriculture/agribusiness in your school. Since we believe each community is different and, therefore, requires a unique program to meet its education needs, we are encouraging you to adapt (not adopt) the suggested curriculum. It is our hope that this guide can assist you in the preparation of the program which best serves your particular situation.

MAJOR PROGRAM OBJECTIVES FOR VOCATIONAL AND TECHNICAL EDUCATION IN AGRICULTURE /AGRIBUSINESS

1. To develop agricultural competencies needed by individuals engaged in or preparing to engage in production agriculture.
2. To develop agricultural competencies needed by individuals engaged in or preparing to engage in agricultural occupations other than production agriculture.
3. To develop an understanding of and appreciation for career opportunities in agriculture and the preparation needed to enter and progress in agricultural occupations.
4. To develop the ability to secure satisfactory placement and to advance in an agricultural occupation through a program of continuing education.
5. To develop the abilities needed to excercise and follow effective leadership in fulfilling occupational, social, and civic responsibilities.
6. To develop those human relations abilities which are essential in agricultural occupations.

Major Objectives and Their Contributory Objectives:

The following section is designed to amplify and explain the major program objectives. The attainment of these objectives depend upon many contributory objectives.

Objective 1: To develop agricultural competencies needed by individuals engaged in or preparing to engage in production agriculture.

The attainment of this major objective requires competencies in one or more areas of plant science, animal science, soil science, agricultural business management, and agricultural mechanization. There are several different occupational levels at which individuals are engaged in production agriculture (owner-operator, manager, tenant, technician, laborer, etc.). Since the knowledge and skills needed at different levels vary, educational programs designed to prepare and upgrade individual workers must also vary in length and level of instruction.

Fulfilling this major objective requires coordination of the course of study and supervised occupational experience.

Specific teaching objectives should be established on the basis of the abilities required of an individual to make satisfactory management decisions and/or perform certain operations in production agriculture. These may be determined by making an analysis of the operative and managerial functions performed by successful farmers or operators of comparable agricultural production businesses.

The following contributory objectives are applicable to farmers and ranchers who produce food and fiber and to operators of greenhouses who produce food and ornamental plants. They also apply to individuals who are involved in the business of producing nursery stock, of landscaping and maintaining grounds, as well as those who grow trees for commercial purposes.

Foremost among contributory objectives are the ablitities to:

1. Begin and advance in production agriculture.
2. Manage an agricultural business effectively by:
   a. Producing agricultural products efficiently
   b. Marketing agricultural products advantageously
   c. Financing an agricultural business successfully
   d. Providing for efficient agricultural buildings and mechanization
   e. Making decisions based upon the analysis of accurate and proper records
   f. Conserving soil and other natural resources
   g. Applying effective employee-employer relationships
   h. Making the most efficient use of physical and human resources in conducting the agricultural business, which may also involve supplemental or alternative sources of income.
3. Maintain a favorable home environment.

Objective 2: To develop agricultural competencies needed by individuals engaged in or preparing to engage in agricultural occupations other than production agriculture.

The efficient production of agricultural commodities requires many goods and services usually provided by specialized businesses. The productivity of the agricultural economy will be influenced by the competencies of the workers in these businesses. Therefore, appropriate educational programs must be designed, not only for those who produce agricultural commodities, but also for those who are engaged, or will engage, in other agricultural occupations — the processing, distribution, and service segments of agriculture. Experience and training in production agriculture are either essential or highly advantageous for workers in all agricultural occupations.

Foremost among contributory objectives are the abilities to:

1. Understand and apply the principles of soil science, plant science, animal science, management, and mechanization as they relate to agricultural occupations.
2. Perform the managerial and operative activities necessary to enter and progress in an agricultural occupation by:
    a. Understanding the marketing and processing of agricultural products, and the provision of related services.
    b. Understanding the principles of selling supplies and providing services to meet specific needs of production agriculture.
    c. Understanding how agricultural businesses are operated and financed, and how these businesses render service to production agriculture.
    d. Understanding what is expected of an employee.
    e. Understanding employer policies and procedures.
    f. Maintaining effective customer relations.
    g. Respecting and wisely using the property of the employer.
    h. Preparing, maintaining, interpreting and using records and reports.
    i. Understanding, interpreting and following memorandums, manuals, and written policies and regulations.

Objective 3: To develop an understanding of and appreciation for career opportunities in agriculture and the preparation needed to enter and progress in agricultural occupations.

Modern agriculture is broad and complex, involving hundreds of professional and technical occupations which require extensive knowledge and highly developed skills, as well as some which require only relatively simple manipulative abilities. Current trends indicate that agriculture will become even more complex and specialized in the future. Thus, individuals aspiring to enter and/or progress in agricultural occupations should acquire knowledge concerning the types of jobs and their characteristics. This would include the number of annual employment opportunities, abilities required, beginning salaries, advancement opportunities, and promise of satisfaction.

In making a tentative occupational choice and beginning to prepare for it, the prospective worker must assess his/her individual characteristics and interests in relation to the requirements of the occupation and the employment opportunities it affords.

Foremost among contributory objectives are the abilities to:

1. Understand and appreciate the importance of agriculture to the nation's economy and its impact upon the daily lives of all citizens.
2. Determine the types and numbers of occupational opportunities in agriculture.
3. Evaluate information concerning agricultural occupations.
4. Study pertinent occupational information in relation to personal characteristics, attitudes, and interests.
5. Obtain exploratory work experience in selected occupations under proper supervision.
6. Appreciate the need for pursuing a program of continuing education to keep abreast of and advance in the occupation.

Objective 4: To develop the ability to secure satisfactory placement and to advance in an agricultural occupation through a program of continuing education.

The main objective of students of vocational and technical education is successful entry and advancement in an occupation. For many occupations, vocational education in full-time high school classes, followed by part-time enrollment in post-high school classes, is sufficient for satisfactory placement and advancement. The increasing number of agricultural occupations require technical or professional education. For students who desire placement at these levels, courses in high school designed to develop vocational competence, supported by other selected subjects, make up a desirable pre-technical or pre-professional program of instruction. Such preparation develops attitudes and abilities which enable the student to complete technical and professional programs successfully. Recognizing the dynamic nature of agricultural occupations, no education program should be considered as terminal. Students must understand that continuous education will be a normal pattern for agricultural workers at all levels.

A student should be aware of occupational opportunities and requirements throughout his/her preparation for a chosen field. Instructors are primarily responsible for developing the student's needed abilities. In fulfilling these responsibilities, they should enlist the aid of other competent persons.

Foremost among contributory objectives are the abilities to:

1. Utilize the services of appropriate agencies and organizations in locating and securing satisfactory employment.

2. Analyze opportunities for self-employment.
3. Analyze job opportunities and requirements, and assess personal abilities and interests in terms of these requirements.
4. Apply for employment and participate in employment interviews.
5. Plan and pursue a program of continuing education appropriate to the requirements of a selected vocation.
6. Make satisfactory progress and advancement in an occupation.

Objective 5: To develop those abilities in human relations which are essential in agricultural occupations.

Vocational and technical education is concerned with the optimum development of each individual. It is not limited to the development of specific and narrow occupational competencies. Therefore, it shares with other segments of education the responsibility for the development of essential human relations abilities. Occupational success is influenced by the interpersonal relationships between the worker, his/her co-workers, his/her employer, and society in general. In many instances the successful application of specific occupational competencies depends on effective human relations.

Foremost among contributory objectives are the abilities to:

1. Appreciate the dignity of work and the need for every individual to make maximum contributions toward his/her occupation, and to the advancement of the family, the community, and the nation.
2. Establish and maintain effective and ethical working relationships with associates.
3. Communicate effectively.
4. Appreciate and follow desirable behavioral standards.
5. Develop acceptable personal work habits.

Objective 6: To develop abilities needed to exercise and follow effective leadership in fulfilling occupational, social, and civic responsibilities.

In a democracy, every occupational area functions in a complex social setting. There is a need for developing constructive, effective leadership abilities in all persons. Modern agriculture demands individuals who can provide leadership in developing programs and policies that will create and maintain an optimum climate for agriculture consistent with the general welfare.

Participation in intracurricular activities of the vocational agriculture student organization (Future Farmers of America) develops individual leadership and stimulates students to set and achieve worthwhile vocational goals. A national organization with state and local units provides a practical laboratory for developing democratic leadership, cooperation, and good citizenship.

Foremost among contributory objectives are the abilities to:

1. Associate with and become a functioning member of an organization.
2. Identify and participate in desirable activities for developing and improving agricultural leadership.
3. Initiate activities that improve agricultural and civic activities.
4. Cooperate for the common good in agricultural and civic activities.
5. Develop and maintain desirable relationships between rural and urban groups.
6. Participate in the development of local, state, national, and international policies and programs affecting agriculture.

CONDITIONS CONDUCIVE TO LEARNING

Learning, for the student studying vocational education in agriculture/agribusiness, is more than a matter of compiling factual knowledge; it is a process of growth in which the student at each age level is presented with challenges. Some of these challenges come from within the student. Others come about by virtue of living in a certain social scheme. As each challenge is presented, the student must come to grips with it, learn how to cope with it, and learn the skills, understandings, and attitudes required to progress through it. Learning, then is a personal matter. It involves the learner's own needs and interest. It's an active process in which the learner reacts to a message. Effective instruction must begin where "the student is." This implies a need for the instructor to determine the knowledge and ability level of the students.

1. MOTIVATION— A STUDENT LEARNS ONLY WHEN HE/SHE IS MOTIVATED TO LEARN. The motivation for some situations may arise from the individual's need, interests, likes and dislikes. For others it may originate through incentives and awards. Learning for most students in vocational agriculture is a combination of both these two drives. A vo-ag teacher supplements the natural interests of youth with appropriate incentives.

2. INVOLVEMENT—LEARNING IS EXPERIENCING. Vocational agriculture/agribusiness students learn from acts performed, words used and thoughts and feelings expressed.

A vo-ag teacher involves students directly in experiences whenever possible.

3. ASSOCIATION—LEARNING IS MOST EFFICIENT WHEN IT PROCEEDS BY A DIFFERENTIATION OF A WHOLE INTO ITS PARTS. Parts derive their meaning from the whole. Material presented in this way is easier to learn than is isolated bits of information and facts. A vo-ag teacher insures that the material presented is organized into meaningful segments so that similarities and differences can be seen by the students.

4. REINFORCEMENT—LEARNING TAKES PLACE WHEN THE ACT (THINKING, FEELING, OR ACTING) THAT IS PERFORMED IS REINFORCED OR REWARDED. The most effective rewards are intangible relationships such as acceptance and approval. A vo-ag teacher accepts all students as possessing dignity and worth as individuals.

5. TRANSFERABILITY—KNOWLEDGE TRANSFERS FROM ONE SITUATION TO ANOTHER WHEN THERE ARE IDENTICAL ELEMENTS IN THE TWO SITUATIONS. A student cannot transfer or apply a principle to a situation with which he/she is not familiar. A vo-ag teacher discovers the prior knowledge and experience of the class memebers as he/she plans to introduce new units.

6. EACH INDIVIDUAL IS DIFFERENT FROM EVERY OTHER INDIVIDUAL. A vo-ag teacher designs each learning experience with the unique needs of the individual student in mind.

EVALUATING VOCATIONAL AGRICULTURE/AGRIBUSINESS PROGRAMS

The effectiveness of a program in vocational agriculture/agribusiness is dependent to a large degree upon a continuous and critical evaluation of the results of the program. Daily observations provide a simple method of evaluation, but extensive, periodic examinations are necessary to develop a course of action that will most effectively utilize the manpower and resources of the department. Critical, unbiased appraisals of one's efforts require courage but provide the only reliable basis upon which to plan future development of the educational program. However, it should be recognized that evaluation results, good or bad, do not necessarily measure the success of the teacher or teachers in the department but also reflect the efforts of the community and those people who are responsible for administering the program.

The teachers and administrators are primarily responsible for directing program evaluation. The most logical procedure for continuous evaluation is through the local vocational education coordinator and the Agricultural Advisory Council. They usually attempt to measure the contributions of the agriculture/agribusiness education program to the individual, community, state and nation. In general, the following points are considered:

1. Is the program designed to satisfy community needs?
2. Is there adequate interaction between the local vocational education coordinator, advisory council and the teacher of agriculture?
3. Is the community informed as to the educational activities of the department? What are the community reactions to the program?
4. What are the attitudes of the students, businesspeople, administrators, and board of education members toward the program?
5. Does the educational program aid in the development of healthy attitudes, desirable interests, good judgment, and the ability to think, analyze and solve problems?
6. What proportion of the students become successfully established in farming, in allied agricultural occupations, or continue their education in the field of agricultural science and industry?
7. Does the program embrace the whole concept of agriculture rather than only segments of the field?
8. Does the department embrace the whole concept of agriculture rather than only segments of the field?
9. Are graduates assuming positions of leadership in agricultural, civic, social, and religious activities of the community?

SUGGESTIONS FOR USING THE CURRICULUM GUIDE FOR INSTRUCTION IN WISCONSIN HIGH SCHOOLS

The suggested course of study has been the result of revision of earlier forms by a large number of instructors in agriculture with assistance from the teacher education and supervisory staffs at the state level. Allocation of time to specific units must be made by the local instructor. Time ranges reflect the need to adjust specific units in accord to the needs of youth in various sections of the state. In some communities, the time devoted to teaching a unit should be extended and for some communities a unit might be reduced. Instructors, with justification, should consider offering units at different grade levels and during different seasons of the year than where indicated if such a re-arrangement will offer a better course of study organization for a particular community. For some communities it might conceivably be desired to delete units, add others, and revise the ones provided if it will make for a better course of study, meeting more adequately the needs and problems of youth enrolled in high school agricultural courses. Beginning teachers should follow the suggested course of study closely. As they become more familiar with the needs, problems and interests of their clientele they should gradually adapt the curriculum to meet the needs of a specific community. Instructors with experience are urged to use the new suggested course of study as a guide in organizing instructional units. Before the school year starts, the instructor should make defininte plans, even though they would necessarily be tentative, as to the time and substance of each unit for the entire course of study. As progress is made during the instructional year, adjustments can be made as may be necessary and desirable.

Preparation for teaching is essential to achieve good, effective teaching. Planning and continuous upgrading and revision of teaching or lesson plans is a part of preparation. This course of study is a tool which, hopefully, will aid you in improving your instruction.

CURRICULUM MODELS FOR BEGINNING INSTRUCTORS IN WISCONSIN

Wisconsin does not have a "standard" curriculum model for vocational agriculture. Standard models are often interpreted as being mandatory or prescriptive. The prevailing philosophy in Wisconsin suggests that the curriculum for each department will be developed locally. Two "suggested" curriculum models are provided here for the particular benefit of the beginning instructor.

About 67 per cent of the vocational agriculture departments in Wisconsin maintain the traditional curriculum structure with courses designated Ag. I, II, III, and IV. This figure corresponds very closely to the per cent of Wisconsin vo-ag departments located in high schools having fewer than 500 students, and having one instructor. These departments devote approximately 20 per cent more instructional time to topics pertaining to basic production agriculture.

The contemporary vo-ag curriculum began to make its appearance by the middle 1960's and has undergone a series of changes. The current trend is toward a two-year basic core of instructional units constituting an introduction to agriculture and providing a background for the more specialized semester-length courses to follow. The contemporary vo-ag curriculum is more prevalent in larger schools having more than one instructor, but can be adapted to any school. The decision of whether to develop the local curriculum according to the traditional or contemproary approach is one that should be made jointly by the teacher(s) of vocational agriculture/agribusiness and the advisory committee. The eventual decision ought to provide the best opportunity for achieving the major program objectives as suggested earlier in this guide.

Sample Curriculum - Traditional

Ag. I

Unit		*Weeks*
I.	Orientation to Vo-Ag, FFA and WJDA	2
II.	Crop and Weed Classification and Identification	3
III.	Soil Sampling	1
IV.	Wisconsin Agriculture	3
	(End 1st Quarter)	
V.	Careers and SOEP's	3
VI.	Identification and Characteristics of Livestock Breeds (Incl. Dairy)	3
VII.	Basic Soils and Soil Conservation	3
	(End 1st Semester)	
VIII.	FFA, WJDA, SOEP Records; Creed Speaking	2
IX.	Principles of Plant Growth	3
X.	Garden, Orchard and Small Fruit Crops	2
XI.	Landscaping	2
	(End 3rd Quarter)	
XII.	Basic Carpentry	6
XIII.	Tractor and Machinery Safety; Operation and Certification	3
	(End 2nd Semester)	

Ag. II

Unit		*Weeks*
I.	FFA, WJDA, and SOEP Records	1
II.	DHIA Record Analysis	1
III.	Livestock and Meat Selection and Judging	7
	(End 1st Quarter)	
IV.	Agricultural Mechanics (Welding; Metal Fabrication; Plumbing)	9
	(End 1st Semester)	

V.	FFA, WJDA, SOEP Records, Public Speaking	2
VI.	The Livestock Industry (Incl. Careers)	1
VII.	Swine Production	3
VIII.	Beef Production	3
	(End 3rd Quarter)	
IX.	Sheep Production	2
X.	Other Liverstock (Incl. Small Animals)	2
XI.	Livestock Nutrition	5
	(End 2nd Semester)	

Ag. III

Unit		*Weeks*
I.	FFA, WJDA and SOEP Records	1
II.	Agricultural Structures and Materials Handling	8
	(End 1st Quarter)	
III.	Dairy Cattle Selection and Management	6
IV.	Ag. Business Organization and Marketing	3
	(End 1st Semester)	
V.	FFA, WJDA and SOEP Records; Extemporaneous Speaking	2
VI.	Establishing and Using Agricultural Records (Taxes)	4
VII.	Soil Management and Fertilization	2
VIII.	Forestry and Woodlot Management	1
	(End 3rd Quarter)	
IX.	Crop Production (Basic Cereal and Forage Crops (Incl. Pasture Mgt.)	7
X.	Using Agricultural Chemicals	2
	(End 2nd Semester)	

Ag. IV

Unit		*Weeks*
I.	FFA, WJDA and SOEP Records	1
II.	Career and Educational Opportunities	2
III.	Human Relations and Communications Skills	3
IV.	Conservation; Ecology and Environment (Energy)	3
	(End 1st Quarter)	
V.	Farm Management (Acquiring a farm and developing a farm plan)	9
	(End 1st Semester)	
VI.	Farm Power and Machinery (Incl. Electricity)	9
	(End 3rd Quarter)	
VII.	Agribusiness (Processing; Sales and Service; Finance)	7
VIII.	National and International Agriculture	2
	(End 2nd Semester)	

Fifth Course in Agriculture

More than three-fourths of the high schools in Wisconsin having vocational agriculture/agribusiness departments maintain the traditional 7 or 8 period day. The vo-ag instructor frequently is obligated for 5 periods, plus one preparation period and one or two visitation periods. Where the teacher is obligated for a 5th period, it is recommended that the obligation be met with a 5th course, rather than the supervision of a study hall or student commons.

Several options for the establishment of a 5th course are offered for consideration:

A. Divide the largest class each year into two sections.
B. Divide each class into two sections during the quarter it is scheduled to be in the shop.
C. Offer a Cooperative Education program for seniors.
D. Select any combination of semester courses from the sample contemporary curriculum.
E. Offer a course for exceptional students in agriculture.
F. Offer an open agricultural mechanics course.
G. Offer an 8th grade course.

Sample Curriculum - Contemporary

Two-Year Basic Core of Instructional Units:

Grade	*Title*	*Content*	*Duration*
9	Agri. I	FFA, WJDA, Careers, SOEP, Wisconsin Agriculture, Livestock Breeds, Soils, Plant Growth and Crop Prod. Basic Carpentry	2 Sem.
10	Argi. II	Ag. Mechanics, Horticulture, Liverstock Production, FFA, WJDA and SOEP	2 Sem.

Specialized Semester Courses:

(Fall Semester)

Grade	*Course*	*Prerequisite*
11-12	Farm Power and Machinery	Ag. II
11-12	The Dairy Industry	Ag. I
11-12	Conservation, Ecology, and Environ. Resources	Ag. I & Biology

(Spring Semester)

Grade	*Course*	*Prerequisite*
11-12	Ag. Structures	Ag. I
11-12	Farm/Bus. Mgt.	Ag. I-II
11-12	Horticulture	Ag. I-II

Course titles listed here are for the purpose of demonstrating the model. Other courses, or additional courses, prerequisites, and grade levels should be determined in consultation with the advisory council according to the needs of the students and the district.

In multiple teacher departments, additional courses may be added, or multiple sections of these same courses may be offered.

WISCONSIN PHILOSOPHY AND PROCEDURES IN DEVELOPING OCCUPATIONAL EXPERIENCE PROGRAMS IN VOCATIONAL AGRICULTURE/AGRIBUSINESS

Since passage of the Smith-Hughes Act in 1917, supervised farming programs have provided the vehicle for carrying instruction in production agriculture to the "doing" stage. The objectives of vocational education in agriculture/agribusiness were broadened by the Vocational Education Act of 1963 and the 1968 and 1976 Amendments to include preparation for careers for all people in any occupation requiring knowledge and skill in agriculture.

An important aspect of the total educational program in agribusiness occupations is the Supervised Occupational Experience of the students. "Supervised occupational experience programs in agriculture consist of all the practical agriculture activities of educational value conducted by pupils outside of class for which systematic instruction and supervision are provided by their teacher, parents, employers, and others."[1]

A supervised occupational experience program is an integral part of the total program of instruction in agriculture. It is not to be viewed as a separate entity and in no way should the student view this experience as a penalty for being enrolled in vocational agriculture. Instruction in the importance, advantages, objectives, and procedures associated with the supervised occupational experience programs must be as diligent as for any of the subject matter areas.

Procedures

Supervised occupational experience programs in agriculture/agribusiness may be in the form of farming programs, work experience (including farm placement), simulated experience, and cooperative education programs. The following steps are suggested as a procedure in the development of supervised occupational experience programs in agriculture/agribusiness.

1. Orientation of parents, employers, and cooperating school personnel to the objectives, procedures, and desirable outcomes of the program.
2. Instructor appraisal of the student's home circumstances and of his/her personal characteristics, competencies, and experiences.
3. Orientation of students individually and by classes.
4. Development of individual student programs.
   a. Survey and analysis of the farm or work experience station.
   b. Determination of student interests, needs, and objectives.
   c. Establishment of student goals.
   d. Budgeting and determination of agreements.
   e. Planning the details of the program.
   f. Development of appropriate records.
5. Evaluation of student-supervised occupational experience programs.
   a. Skills learned and information acquired.
   b. Scope and success of managerial experience.
   c. Initiative exhibited by the student.
   d. Degree of student interest and pride stimulated in agriculture as a career area.
   e. Progress toward establishment in an agricultural career or toward continued education in agriculture.
   f. Labor income or gain in assets from the occupational experience program.

The teacher of vocational agriculture/agribusiness coordinates and conducts the ongoing activities with a view toward attaining the general objectives of the program which is to prepare students for employment, establishment, or further education in an occupation, business, or profession requiring knowledge and skill in agriculture.

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[1] Phipps, Lloyd J., *Handbook on Agricultural Education in Public Schools*, The Interstate Printers and Publishers, Danville, Ill., 1972, Third Edition.

AGRIBUSINESS ACCOUNTING

I. Performance Objectives

Upon competion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in agribusiness accounting and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Define and associate words and terms involving agribusiness accounts.
- C. Prepare a net worth statement.
- D. Develop a net income statement.
- E. Prepare a labor income statement.
- F. Compare the three methods of computing depreciation.
- G. Prepare an inventory.
- H. Analyze strong and weak points of a farm business by utilizing account records.
- I. Prepare a complete federal and state income tax return.
- J. Prepare an investment credit form.
- K. Prepare a social security form.

II. Concepts to Develop

- A. There are career opportunities in agribusiness accounting for young men and women at all levels of educational preparation.
- B. Correct accounting procedures are beneficial to any business organization.
- C. Record analysis should be performed periodically to determine strengths and weaknesses in the business.
- D. A certain body of knowledge and skills are necessary in record keeping.
- E. The preparation of tax returns requires skill in retrieving information from records and correct interpretation of internal revenue service guidelines.
- F. There are four basic methods of doing business in the United States.

III. Subject Matter to Teach

- A. Careers
  - 1. Current and future employment needs.
  - 2. Job description.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relating to student needs and aspirations.
- B. Comparative methods of doing business
  - 1. Individual proprietorship.
  - 2. Partnership.
  - 3. Profit corporation (including pseudo).
  - 4. Non-profit corporation.
- C. Benefits derived from keeping records.
  - 1. Income tax.
  - 2. Know where you stand.
    - a. net-worth statement.
    - b. net income (yearly)
    - c. labor income.
    - d. analysis of strengths and weaknesses.
  - 3. Tool for obtaining credit.
  - 4. Division of profits (partnerships).
- D. Basic terms used in keeping records
  - 1. Income vs. expense.
  - 2. Assets vs. liabilities.
  - 3. Net income vs. labor income.
  - 4. Net income vs. net worth.
  - 5. Partial budgets.
  - 6. Depreciation methods compared.
    - a. straight line.
    - b. double declining balance.
    - c. sum-of-the-year's digits.
- E. Farm account exercise
  - 1. Farm expense.
  - 2. Farm income.
  - 3. Farm inventories and depreciation.
  - 4. Net income statement.
  - 5. Net worth statement.
- F. Analysis of above exercise (to include)
  - 1. Dairy (profitable goals).
    - a. Milk sold per cow (14,000 #).
    - b. Percent of feed purchased (25-35%).
    - c. Percent of cows in milk (90%).
    - d. Cows per man (40).
    - e. Buildings and equipment invested per cow ($800).
    - f. Veterinary and medicine per cow ($14).
    - g. Percent of calf loss (10% or less).
  - 2. Crop (profitable goals)
    - a. Crop value per crop acre ($125).
    - b. Crop yields per acre (locally).
    - c. Crop expense per crop acre ($25).
    - d. Crop acres per man (140).
    - e. Fertilizer expense per crop acre ($18).
  - 3. Profitability
    - a. Returns to labor and management.

b. Rate of return to capital invested (9%).

c. Operating income per $1.00 operating expense ($2.00).

4. Solvency

a. Ratio of current liabilities to current assets (.5).

b. Ratio of total liabilities to total assets (.5 to .6).

G. Types of taxes

1. Real estate or property tax.

2. Sales tax.

3. Income tax.

H. Federal income tax returns (Based on D above).

1. Form 1040 (schedule F) (farm income and expense).

2. Form 1040 (schedule D) (long term capital gains).

3. Form 1040 (schedule SE) social security.

4. Form 3468 (investment credit).

5. Form 1040 (individual).

IV. Motivation

A. Class presentations by personnel such as lawyer, accountant or successful farmer.

B. Films, slides and filmstrips.

C. IBM record sheets.

D. Visit an income tax office.

E. Field trips to local business operations to view accounting procedures.

V. Learning Activities

A. Occupational experience program.

B. Prepare tax returns on the home farm business or on a farm operation used as a class exercise.

C. Determine farm income and expenses from available farm records.

D. Establish production goals for the home farm or on a farm operation used as a class exercise.

E. Set up a depreciation schedule for machinery and equipment on the home farm or on a farm operation used as a class exercise.

F. Prepare net income and net worth statement from available farm records.

VI. Materials Needed

A. Books

1. Mortenson & Luening. *Farm Management Handbook*. Interstate. 1979.

B. Bulletins and Pamphlets

4. Your Federal Income Tax. Department of the Treasury, I.R.S.

5. Income Tax Management. Publication #2, North Central Regional Extension

6. Tax Management Guide. Doane Agricultural Service, Inc.

7. Wisconsin Farmland Preservation Program G2890, Farmland and Open Space Taxes: What Kind of Law for Wisconsin G2694, Income Tax Management for Farmers A9NXT002, Wisplan - A New Tool for Analyzing Farm Investments and Business Expansions A7741104, Farm Business Depreciation - Use it or Lose it A2988, What You Should Know About Investment Credit A2987, Wisconsin Five Year Inventory and Depreciation Schedule Record Book A2577, Farmers Tax Guide AZIRS225. University of Wisconsin -Extension.

C. Workbooks

3. Understanding Taxes - Student Workbook - Publication 21, Farm Supplement - Publication 22, Charts, Department of the Treasury, I.R.S.

D. Films

1. The Agrifax. Production Credit Association or Farm Credit Administration

AGRICULTURE - STATE AND NATIONAL

I. Performance Objectives

Upon completion of this unit, the student will be able to:

A. Understand the job opportunities open to students of agriculture.

B. Appreciate the world's need for agriculture.

C. Understand the importance of agriculture to the state economy as compared to other segments.

D. Explain the complexity of agriculture in Wisconsin.

E. Be familiar with the types of agricultural production in the state.

F. Determine Wisconsin's rank in production of major areas: Dairy, livestock, cash crops, specialty areas, canning, etc.

G. Be familiar with the outlets and markets for Wisconsin farm products.

H. Determine the trends of size and number of farms of county and state.

I. Determine size and number of farms of home counties as compared to state and nation.

J. Determine rank of home counties in major areas of production.

II. Concepts to Develop

1. There are many career opportunities in agribusiness.
2. Certain nations are producers of surplus food while others are deficient in food production.
3. The transition and development of agriculture in the state and nation from self-sufficiency to a specialized industry.
4. Wisconsin is an important source of food in the nation and the world.
5. Wisconsin ranks in the nation's production of food and fiber.
6. Home counties and communities are specialized areas of production of crops, livestock, dairy and others.

III. Subject Matter

1. High % of jobs are agriculture related.
2. Migration of rural to urban America for job opportunities.
3. The United States is source of food for the world.
4. Trends in production, processing, and marketing of agricultural products.
5. Trends in per capita consumption of agricultural products.
6. Identify and compare Wisconsin to other states in terms of the production of agricultural products.
7. Identify and compare local counties, with other counties in the state, in terms of the production of agricultural products.

IV. Learning Activities

1. Field Trips
2. Resource People
3. Map Development
   a. Production areas
   b. Consumption areas
4. Charts and Graphs

V. Motivation

1. Field Trips
2. Bulletin Board Display
3. Films

VI. Materials

1. Wisconsin Agricultural Statistics
2. United States Agricultural Statistics
3. Wisconsin Dairy Facts
4. Films:
   a. Wisconsin Farming
   b. Wisconsin Cheese

ANIMAL MANAGEMENT AND CARE - SMALL

I. Performance Objectives

Upon competion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in small animal management and care and will be able to relate these factors to his/her own specific needs and aspirations.
B. Describe the history of small animal domestication.
C. Identify breeds and characteristics of small animals and their use.
D. List the major parts and explain the function of each system which makes up the anatomy and physiology of small animals.
E. List and be able to explain reproduction and breeding systems for each kind of small animal.
F. Describe the basic principles of nutrition involved with small animals.
G List the major diseases and parasites of small animals and their control measures.
H. Plan a satisfactory system of sanitation for small animals.
I. Explain recommended housing and/or caging systems for small animals.
J. Demonstrate the correct grooming, handling and training of selected small animals.
K. Describe the procedures used in sexing of small animals.
L. Describe the kinds of record keeping necessary for small animal management.
M. Use and understand the terminology used in this career area.

II. Concepts to Develop

A. There are career opportunities in small animal management and care for young men and women at all levels of educational preparation.
B. Small animal domestication is not new.
C. The anatomy and the physiology of small animals, although complex, parallel all other vertebrae and mammals.
D. Reproduction and breeding of small animals is complex.
E. Small animals need proper nutrition.
F. Small animals are affected by diseases and parasites.

G. Housing for small animals is critical.
H. Special management procedures are needed for small animal care.

III. Subject Matter to Teach

- A. Careers
  - 1. Current and future employment needs
  - 2. Job description
  - 3. Training requirements
  - 4. Working conditions
  - 5. Opportunity for advancement
  - 6. Other factors relating to student needs and aspirations
- B. Employment opportunities which involve small animal care and management
  - 1. Animal technician (veterinary assistant)
  - 2. Animal caretaker
  - 3. Small animal laboratory technicians
  - 4. Pet store help or management
  - 5. Veterinary profession
    - a. Job duties for each
    - b. Requirements and training for job entry in each
- C. The dominion of man over small and large animals
  - 1. Early history of domestication
  - 2. Animal classification and identification
  - 3. Breed identification
  - 4. Development and use of breeds
- D. Kinds of small animals which require care and management
  - 1. Laboratory animals
  - 2. Dogs (canines)
  - 3. Cats (felines)
  - 4. Small stock and fur animals
- E. Anatomy and physiology (by species)
  - 1. The skeletal system
  - 2. The respiratory system
  - 3. The circulatory system
  - 4. The digestive system
  - 5. The endocrine system
  - 6. The reproductive system
  - 7. The nervous system
  - 8. The excretory system
  - 9. The muscular system
  - 10. The skin
- F. Reproduction and breeding (by species)
  - 1. Physiology of reproduction
  - 2. Reproduction in the male
  - 3. Reproduction in the female
  - 4. Breeding small animals
- G. Nutrition and feeding (by species)
  - 1. Basic principles of nutrition
  - 2. Feed composition and measures of nutrient value
  - 3. Routine and experimental feeding
  - 4. Methods of feeding
  - 5. Food consumption
  - 6. Nutrient requirements
- H. Health problems, disease and parasite control
  - 1. Common infections and noninfectious diseases
  - 2. Transmission or spread of diseases
  - 3. Disease diagnosis - general procedures
  - 4. Common external and internal parasites
  - 5. Noninfectious and miscellaneous ailments
  - 6. Management practices, sanitation, and disease control
- I. Housing and caging small animals
  - 1. The animal house or housing facility
  - 2. Animal cages
  - 3. Feeding and watering equipment
- J. Management of small animals
  - 1. Handling and restraint
  - 2. Sexing
  - 3. Record keeping
  - 4. Legal requirements

IV. Motivation

- A. Field trips to animal shelters, veterinary clinics, pet stores and the like.
- B. Class presentations by veterinarians, animal technicians, animal shelter managers, pet store owners, and by individuals from educational institutions offering advanced training in this career area
- C. Bulletin board displays
- D. Slide and motion picture presentations on small animal care and management

V. Learning Activities

- A. Occupational experience program.
- B. By means of a flow diagram trace the history and use of one or more breeds of small animals
- C. Develop a management outline for one kind of small animal
- D. Collect literature and samples of small animal management aids (feeds, health, etc.)
- E. Individual or panel reports on various aspects of small animal care and management
- F. Raise and manage a cage of small animals within the classroom area or vicinity
- G. Take part in animal shows and fairs.

VI. Materials Needed

A. Books
  1. Animal Welfare Institute. Basic Care of Experimental Animals. New York, New York. 1970.
  2. Arrington. Introductory Laboratory Animal Science. Interstate. 1972.
  3. Campbell and Lasley. The Science of Animals That Serve Mankind. McGraw-Hill Book Co. 1969.
  4. National Academy of Sciences — National Research Council. Nutrient Requirements of Dogs. Publication 989. Washington, D.C. 1962.
  5. National Academy of Sciences — National Research Council. Nutrient Requirements of Laboratory Animals. Publication 990. 1962.
  6. National Academy of Sciences — National Research Council. Nutrient Requirements of Rabbits. Publication 1194. 1966.
  7. Scheid. Raising Game Birds. The Highsmith Co., Fort Atkinson, Wisconsin. 1970.
  8. Sims and Johnson. Animals in the American Economy. Iowa State University Press. 1972.
  9. Templeton. Domestic Rabbit Production. Interstate. 1968.
  10. Whitney. The Complete Book of Cat Care. Doubleday & Co. 1973.
  11. Whitney. The Complete Book of Dog Care. Doubleday & Co. 1973.

B. Bulletins and Pamphlets
  1. "Animal Technician Brochure" and information packet, Agricultural Division, Madison Area Technical College, Madison, Wisconsin.
  2. "Bringing Up Pup" Armour Pharmaceutical Co. Chicago, Illinois.
  3. "Cat Project", 4-H 243, University of Wisconsin Extension, Madison, Wisconsin.
  4. "Dog Care Book" Polk-Miller Products Inc., Richmond, Virginia.
  5. "Dog Obedience and Showmanship", 4-H 246, University of Wisconsin Extension, Madison, Wisconsin.
  6. "Feeding and Managing Rabbits" Hubbard Milling Co., Mankato, Minnesota.
  7. "Grooming and Handling Dogs", University of Wisconsin Extension, Madison, Wisconsin.
  8. "Purina Rabbit Book", Ralston-Purina Co., St. Louis, Missouri.
  9. "Rabbit Project", 4-H 189, University of Wisconsin Extension, Madison, Wisconsin.
  10. "The Care of Dogs and Puppies", University of Wisconsin Extension, Madison, Wisconsin.
  11. "Training your dog for family living", University of Wisconsin Extension, Madison, Wisconsin.

C. Movies and Films
  1. Care of Pets (2nd Edition) EBF, BAVI, University of Wisconsin Extension, Madison, Wisconsin.
  2. Pet Care, Film Forum, BAVI, University of Wisconsin Extension, Madison, Wisconsin.

ANIMAL NUTRITION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job description, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in animal nutrition and will be able to relate these factors to his/her own specific needs and aspirations.
B. List and discuss the basic nutrients and their functions.
C. Define the terms associated with feed analysis.
D. Identify on a drawing the parts of a digestive tract, describe functions of the parts of the digestive tract.
E. Describe in sequence the digestive processes.
F. Define major categories of nutrient use in the animal body, and to interpret and apply the NRC (National Research Council) tables concerning animal nutritive requirements.
G. List the specific thumb rules of feeding.
H. Identify symptoms, diagnosis, prevention and treatment of nutrient deficiencies.
I. Interpret and apply data of NRC on nutrient content of common feeds.
J. Formulate a balanced ration when given specific information.
K. List the economic advantages in the maximum use of home-grown feed.
L. Determine least cost rations using alternative feed supplements.

M. Interpret and compare ingredients listed on feed tags to determine most economical feed.
N. Correctly obtain feed samples for chemical analysis.
O. Interpret and apply information from chemical feed analysis.
P. List harvesting and storage alternatives, compare the quality of feed under alternative harvesting and storage systems.
Q. Identify new concepts in feeding.

II. Concepts to Develop

A. There are career opportunities in animal nutrition for young men and women at all levels of educational preparation.
B. Each basic nutrient has a function in the animal.
C. The nutrient value of home grown feeds should be determined by testing.
D. The digestive system performs an important function.
E. Nutritive requirements of a feed determine its use.
F. Feeding is related to animal health.
G. Thumb rules of feeding have practical value.
H. A balanced ration is practical as well as economical.
I. Feed quality is affected by harvesting and storage methods.
J. Feeding practices change as new methods and technology are employed.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
B. Introduction
  1. Importance of good feeding.
  2. Economic considerations.
C. Basic nutrients and functions.
  1. Carbohydrates.
  2. Fats.
  3. Proteins.
  4. Minerals.
  5. Vitamins.
  6. Crude components i.e., fiber, ash, protein, fat.
D. Nutritive values of feeds (feed analysis)
  1. Roughages (discuss forages common to area)
    a. Dry matter.
    b. Crude and digestible protein.
    c. Total digestible nutrients (TDN).
    d. Estimated net energy (ENE).
    e. Crude fiber.
    f. Minerals.
    g. Vitamins.
    h. Palatability factor.
  2. Concentrates (discuss grains common to area).
    a. Dry matter.
    b. Crude and digestible protein.
    c. Total digestible nutrients (TDN).
    d. Estimated net energy (ENE).
    e. Crude fiber.
    f. Minerals.
    g. Vitamins.
    h. Palatability factor.
E. Ruminant digestive process.
  1. Parts and functions of digestive tract.
  2. Digestive processes.
    a. Mechanical factors.
    b. Enzymes.
    c. Bacterial.
F. Simple stomach animal.
  1. Parts and functions of digestive tract.
  2. Digestive processes.
    a. Mechanical factors.
    b. Enzymes.
    c. Bacterial.
G. Nutritive requirements of all classes of animals.
  1. Maintenance.
  2. Growth.
  3. Reproduction.
  4. Production.
  5. Herd health as affected by feeding.
H. Basic thumb rules of feeding.
  1. Roughage.
  2. Grain.
  3. Dry matter basis.
  4. As-fed basis.
I. Balancing rations.
  1. Nutritive requirements of animals.
    a. Protein.
    b. TDN.
    c. Minerals and vitamins.
  2. Home-grown feeds
    a. Maximum utilization.
    b. Economics.
  3. Purchased feed.
    a. Ration supplements, i.e., protein, vitamins, minerals, additives
    b. Roughages and grains.

c. Economics.
4. Analysis of commercial feeds.
5. Analysis of home-grown feeds.

J. Feeding systems as affecting feed quality.
1. Harvesting alternatives (Pasture included).
2. Storage alternatives.

K. New developments.

IV. Motivation

A. Comparison of home feeding program to accepted standards.

B. Field Trips.
1. Local feed mill.
2. Outstanding farm in area.

C. Resource personnnel - Extension personnel, veterinarians.

V. Learning Activities

A. Occupational experience program.

B. Feed sample display.

C. Balance ration according to DHI Feeding Guide.

D. Examine digestive tract from slaughtered animal.

E. Collection of feed tags for comparison.

F. Demonstration of least cost ration with use of computer.

G. On-farm forage and grain sampling.

H. Farm field trip comparing forage harvesting and storage alternatives.

I. Veterinarian speak to class on feeding as it affects animal health.

VI. Materials Needed

A. Books
1. Ensminger. Feeds and Nutrition, Interstate, 1978. National Farm Book Co. Omro.
2. Feed Guide - Hoard's Dairyman, Fort Atkinson.
3. Cassard. Approved Practices in Feeds and Feeding. Interstate. 1971.
4. Crampton. Applied Animal Nutrition. 2nd Edition. W.H. Freeman and Co. 1969.
5. Diggins and Bundy. Dairy Production. Prentice-Hall, Inc. 1969.
6. Foley, Bath, Dickinson, Tucker. Dairy Cattle Principles, Practices, Problems, Profits. Lea and Febiger. 1972.
7. Morrison. Feeds and Feeding. Interstate. 1969.
8. Reaves. Dairy Cattle Feeding and Management. John Wiley and Sons, Inc. 1967.

B. Bulletins and Pamphlets
1. The following are available from the University of Wisconsin-Extension:

A2309 -	"Taking Good Forage Samples."
A2286 -	"If Cows Could Talk."
A2266 -	"UREA - Questions and Answers"
A2251 -	"A Comparison of Haylage and Wilted Grass Silage Plus Hay in Dairy Cow Diet."
A2180 -	"Using the Ohio Feed Guide."
A2183 -	"Selecting the Grain Mix Protein Level in Dairy Rations."
A2169 -	"High Moisture Ensiled Corn for Dairy Cattle."
A2123 -	"A Comparison of Two Concentrates for Lactating Dairy Cattle."

Agriculture News Feature - New Holland Division of Sperry Rand.

C. Films and Filmstrips.
1. "Rumen Story" - Ralston Purina Co.
2. "Swine Digestion" - University of Missouri - Columbia Instr. Mtls. Laboratory
3. "Digestion in the Dairy Cow" - University of Missouri - Columbia Instr. Mtls. Laboratory
4. "A Grain of Salt" - Modern Talking Picture Service
5. "Read the Label, Set a Better Table " - Modern Talking Pictures

D. Laboratory Manuals
1. Vo-Ag. Workbook #2 (Feed and Feeding Section) Pynnonen, A., National Vo-Ag Book Co., Sheldon, Wisconsin 54766.

E. Periodicals
1. Animal Nutrition and Health.
2. Dairy Herd Management.
3. Farm Journal.
4. Feedstuffs.
5. Hoard's Dairyman.
6. Journal of Dairy Science.
7. Successful Farming.
8. Wisconsin Agriculturist.

BEEF PRODUCTION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the beef industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Summarize in writing the history of the beef industry.
C. List the breeds currently in use and describe identifying characteristics.
D. Describe the systems of beef production.
    1. Birth to weaning
    2. Weaning to 750 pounds
    3. 750 pounds to maturity
E. Describe chronologically the management of the cow prior to breeding through gestation, through calving.
F. Describe chronologically the management of the bull prior to breeding season, during breeding, and maintenance when not in use.
G. Describe chronologically the management of the calf including care at parturition, nursing to weaning, growing to maturity.
H. List and be able to identify — tools and equipment useful in beef production.
I. Construct a model, or draw a suitable efficient beef handling facility including a corral with sorting pens, chute and headgate.
J. Describe, draw, or build suitable housing, and feedlot facilities for beef cows, feeder stock, and finishing cattle.
K. Describe the practices necessary for establishing pasture for beef cattle.
L. List diseases of beef cattle.
M. List symptoms, prevention, and treatment of the above.
N. Know current F.D.A. regulations of drugs and chemicals.
O. List and be able to identify animals and carcasses, according to U.S.D.A. market and cutability grades.
P. List 5 methods of marketing beef cattle and describe advantages and disadvantages of each.
Q. Demonstrate proper showing and fitting of a beef animal.
R. List advantages and disadvantages of selecting breeding stock according to:
    1. Type.
    2. Performance data.
    3. Pedigree.

II. Concepts to Develop

A. There are career opportunities in the beef industry for young men and women at all levels of educational preparation.
B. A knowledge of the characteristics of the traditional beef breeds is helpful in understanding contemporary trends in breeding.
C. Systems of beef production consist of the cow-calf operation, feeder calf to market, yearling to market and the production of breeding stock.
D. Management of the breeding herd begins with the selection and continues through care before and during breeding, gestation, calving, and lactation.
E. Three stages in the management of calves and young stock are calving to weaning, weaning to 750 #, and 750 # to maturity.
F. Beef facilities and their management will vary according to the system of operation, geographical and climatic conditions, and personal preference.
G. A sound health and sanitation program, consistent with state and federal regulations, is necessary in order to capitalize on sound management in all other aspects of the beef production program.
H. Marketing the end product is the final step in the beef production program.
I. Fitting and showing of beef animals allows the student to demonstrate selection and management skills acquired in class and at home.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs.
    2. Job description.
    3. Training requirements.
    4. Working conditions.
    5. Opportunity for advancement.
    6. Other factors relating to student needs and aspirations.
B. Historical background of the beef industry
    1. Early development to present.
    2. Breeds. The characteristics of each.
C. Systems of beef production
    1. Cow-calf operations.
        a. calf to weaning.
        b. calf to finish.
    2. Feeder calf to market, (long term feeding).

    3. Yearling to market, (short term feeding).
    4. Breeding stock production.
- D. Breeding stock management
    1. Selection.
    2. Before breeding.
    3. Gestation.
    4. Calving.
    5. Lactation.
    6. Artificial Insemination.
    7. Crossbreeding.
- E. Calf and young stock management
    1. Calving time to weaning.
    2. Weaning to 750#.
    3. 750# to maturity.
- F. Beef facilities and their utilization.
- G. Health and sanitation.
    1. State and federal rules and regulations.
    2. Disease and parasite control on the farm.
- H. Marketing
- I. Fitting and showing of beef animals

IV. Motivation

- A. Field trips for selection of breeding stock and market cattle.
- B. Field trips for buildings, equipment and other facilities.
- C. Visuals on beef production.
- D. Bulletin board display.
- E. Field trips to agribusinesses associated with the beef industry.
- F. Resources speakers.

V. Learning Activities

- A. Occupational experience program.
- B. Collection and interpretation of performance test data.
- C. Management skills.

VI. Materials Needed

- A. Books
    1. Ensminger. *Animal Science*. Interstate. 1977
    2. Ensminger. *Beef Cattle Science*. Interstate. 1976
    3. Bundy & Diggins. *Livestock & Poultry Production*. Prentice-Hall, Inc. 1975. 4th Edition
    4. Bundy & Diggins. *Beef Production*. Prentice-Hall, Inc. 1971.
- B. Bulletins and Pamphlets
    1. University of Wisconsin Publications:

A2429 - “Infectious Bovine Rhinotracheitis”
A2428 - “Bovine Virus Diarrhea”
R2401 - “Efficiency and Profit Differences of Angus Charolais, and Hereford Cattle”
R2398 - “Feed Requirements”
A2387 - “Ration for Beef Cattle”
A2049 - “Preconditioning Feeder Calves”
A2048 - “Beef Feeding Costs of Heavier Weights”
A1B286A - “Beef Cattle Breeding”
FB2196A - “Finishing Beef Cattle”
FB2141A - “Dehorning, Castrating, Branding and Marketing Beef”
FB2126A - “The Farm Beef Herd”
LF536A - “Keeping a Cow”

- C. Films and Filmstrips
    1. “The Brangus Story.” International Brangus Association.
    2. “Charolais for Profitable Cross Breeding.” Modern Talking Pictures.
    3. “The Charolais Report.” Modern Talking Pictures.
    4. “CO-RAL” Chemagro, Advertising Section.
    5. “Impact: The Story of the Brahman Breed” (3940). Modern Talking Pictures.
    6. “One Man’s Approach to Beef Housing.” U.S. Steel Corporation.
    7. “Profit Insurance.” Farm Film Foundation.
    8. “Santa Gertrudis Breed Profit.” Farm Film Foundation.
    9. “What It Takes Is Time” (3946) Modern Talking Pictures.
    10. “7000 Years New.” 14½ min., Venard Films
    11. “Tomorrows Beef Today.” 45 min., Venard Films
    12. “Cattle Breeds Identification.” 82 slides, Northridge Communications Company.
- D. Laboratory Manuals
    1. Vo-Ag. Workbook #2 (Beef Management Section) National Vo-Ag. Book Co., Sheldon, Wisconsin.
- E. Periodicals
    1. *Better Beef Business.*
    2. *Breed Association Publications.*
    3. *Drovers Journal.*

BEEKEEPING

I. Performance Objectives

Upon completion of this unit the students will be able to:

- A. Understand basic beekeeping concepts.
- B. Spell and define the following terms:
  - Hive
  - Swarming
  - Apiculture
  - Pheeomone
  - Royal Jelly
  - Queen Excluder
  - Hornet
  - Wasp
  - Pollination
  - Honey
  - Queen Bee
  - Drone
  - Pollen
  - Propolis
  - Larvae
  - Worker Bee
  - Cluster
  - Super
- C. State the basic parts of a beehive.
- D. Light and make a smoker work.
- E. Recognize the queen, worker drone bee.
- F. List the different races of bees.
- G. List the function of each type of honey bee.
- H. Recognize the worker brood.
- I. List the life span of a worker bee.

II. Concepts to Develop

- A. There are career opportunities in the bee industry for young men and women at all levels of educational preparation.
- B. Apiculture is an old career.
- C. Honey is a national food.
- D. Beekeeping is a 12 month operation.

III. Subject Matter to Teach

- A. Classification of Bees
  - 1. Italions
  - 2. Caucasians
  - 3. Caroniolian
  - 4. Dark Bees
- B. History of Beekeeping
  - 1. Egyptians
  - 2. Indians
  - 3. Wisconsin
- C. Colony and Components
  - 1. Type of Bee... worker... drone... queen
- D. Protection of the hive
  - 1. Guard bees
  - 2. Bee Sting
    - a. pheronome
    - b. smoke
  - 3. Bee dance
    - a. Wagtail
    - b. Short steps
- E. Seasonal management technique during the year.
  - 1. January - December

IV. Motivation

- A. Field trip to a bee yard.
- B. Bulletin Board display
- C. Live bee display in classroom.
- D. Films
- E. Film strips
- F. Transparencies

V. Learning Activities

- A. Working with bees.
- B. Extracting honey.
- C. Tasting different kinds of honey.

VI. Materials Needed

1. *Teal.* Junior Book of Insects, E.P. Dullon & Co., 1968 May
2. *Media Ohio.* 500 Answers to Bee Questions, A.I. Root Co. 1973
3. *Metcalf.* Destructive & Useful Insects, McGraw-Hill Book Co. 1962
4. *Jaques.* How to Know Insects, W.M.C. Brown Co. 1947
5. *Davidson and Peaus.* Insects Pests of Farm Gardens and Orchards, John Wiley & Sons, Inc. 1966
6. *Swain.* The Insect Guide, Doubleday & Co., Inc. 1948
7. *Stefferud.* Insects, U.S. Government Printing Office 1952
8. *Zim.* Insects, Simon & Schuster 1958
9. *Dadant.* First Lessons in Beekeeping, Journal Printing 9 1975
10. *Rahmlow.* Beekeeping in Wisconsin, University of Wisconsin Oct. 1968
11. *Kelley.* How to Keep Bees & Sell Honey, Walter Kelley Co. 1975
12. *Farrar.* Life of the Honey Bee
13. *Farrar.* Productive Management of Honey Bee Colonies
14. *Gojmerac.* Building & Operating an Observation Bee Hive.
15. *Luening & Gojmerac.* Beekeeping Records
16. *Jaycox.* Beekeeping in Illinois . . . Agri Productions ABC & XYZ of Bee Culture, A.I. Root Co.
17. First Lesson in Beekeeping, American Bee Journal
18. Hive & the Honey Bee, Roy A. Grout, Dadant & Sons
19. Starting Right With Bees, A. I. Root Co.
20. American Honey Plants, 1947, Frank C. Pellett
21. Beekeeping. MacMillon Shw. & Echart, 1960
22. *Frisch.* Bees Vision Chemicals Senses & Language, Cornell Press 1950
23. *Root.* Beeswax, Chemical Publishing Co. 1951
24. *Ribbands.* Behavior & Social Life of the Honey Bee, 1952
25. *Landauer.* Communication Among Social Insect
26. *Frisch.* Dancing Bees, 1954

27. *Hambleton*. Honey Bee, 1962
28. *Free*. Insect Pollination of Crops, Academic Press 1970
29. *Beck & Smedley*. Honey & Your Health, 1944
30. *Killion*. Honey in the Comb, 1951
31. *Lovell*. Honey Plants Manual, 1956, A. I. Root
32. *Maeleilinck, Dodd, Mead*. Life of the Bee
33. *Phillips*. Makers of Honey, 1956
34. *Pellett, Jost, Kieker*. Practical Queen Rearing
35. *Laidlaw Echart*. Queen Rearing Univ. Calif. Press, 1962
36. *Butler*. World of the Honey Bees, Collins, 1954
37. National Geographic, V. 67, No. 4, PP 401-482, 1935
38. National Geographic, Vol. 116, No. 2, PP 188-217, 1959

CANNING INDUSTRY AND FOOD PROCESSING

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the food industry and will be able to relate these factors to his own specific needs and aspirations.
B. List and describe significant highlights of the history of food preservation.
C. Identify and compare the various constituents of food.
D. Contrast the deteriorative factors leading to food spoilage.
E. Compare the various food preservative methods.
F. Select the various unit operations used in the processing of a specific vegetable.
G. Explain the specific accomplishments of each unit of operation.
H. Comprehend significant laws and regulations associated with the food industry.
I. Discuss the various food-borne illnesses that could have their origin in the food processing chain.
J. Choose appropriate procedures for cleaning equipment.
K. Aanlyze new methods of food preservation and point out new foods on the market preserved by these methods.
L. Identify and list the various trade associations in the vegetable processing area.

II. Concepts to Develop

A. There are career opportunities in the canning and food processing industry for young men and women at all levels of educational preparation.
B. Foods vary in their nutritional content.
C. Various procedures and methods are utilized in processing food.
D. Quality controls result in a tasty food safe for human consumption.
E. Federal and state sanitation regulations are essential in the food processing industry.
F. Several methods of preserving food are utilized in the canning and processing industry.

III. Subject Matter to Teach

A. Careers
    1. Current employment information.
    2. Job description.
    3. Training requirements.
    4. Working conditions.
    5. Opportunity for advancement.
    6. Other factors relative to potential employment.
B. Historical background of the food industry.
    1. Early development to present.
C. The science of food preservation
    1. Constituents of food stuffs.
    2. Factors that lead to deterioration.
D. Unit operations in food processing
    1. Grading, cleaning and packaging.
    2. Methods of heat processing.
E. Quality factors and their measurement
    1. Testing equipment and methods of use.
F. Legal aspects of food processing
    1. Federal legislation.
    2. State legislation.
    3. OSHA
G. Sanitation
    1. Health rules.
    2. Procedures in local plants.
H. Trends in the food industry
    1. Latest technology.

IV. Motivation

A. Field trip to canning factory.
B. Factory employer class presentation.
C. Bulletin board displays.
D. Slide series on food processing.

V. Learning Activities

A. Occupational experience programs.

B. Design a flow diagram of a processing operation.
C. Check pH of canned materials.
D. Panel reports on various areas of food processing.

VI. Materials Needed

A. Books
  1. Joslyn & Heid. *Food Processing Operations. Their Management, Machines, Materials and Methods.* Avi Publishing Co.
  2. Potter. *Food Science.* Avi Publishing Co.
  3. Stare. *The Story of Wisconsin's Great Canning Industry.* Canning Trade, Baltimore, Maryland
B. Bulletins and pamphlets
  1. "Announcements of Courses," Fond du Lac, Wisconsin: Moraine Park Technical Institute, VTAE District #10, Catalogue, Current Edition.
  2. "A Condensed History of the Science and Technology of Thermal processing," Goldblith & Samuel. Institute of Food Technologists, Chicago, Illinois.
  3. "Fruit & Vegetable Processing Jobs," Wisconsin State Employment Service. Madison, Wisconsin.
  4. "Home Canning - Beans, Tomatoes and Pickles." Ball Company
C. *Films and Filmstrips*
  1. "Agribusiness is Everyone's Business" BAVI. 6804.
  2. "Careers in Food Science & Technology" institute of Food Technologists, Chicago, Illinois.
  3. "Rewarding Careers in a Dynamic Industry" BAVI. 7409.
  4. "Why Foods Spoil" BAVI. 4081.
  5. "Wisconsin Agriculture" BAVI. 4129.
D. *Laboratory Manuals*
  1. *Laboratory Manual for Vegetable Processing Instruction.* Seemann & Koene. Moraine Park Technical Institute. Fond du Lac, Wisconsin.
  2. National Canners Association. Laboratory Manual for Food Canners and Processors, Vols. I and II. Westport, Conn. Avi Publishing Co.
  3. Sanitation Manual. Wisconsin Department of Health.
E. Periodicals
  1. Canner/Picker.
  2. Food Engineering.
  3. Food Product Development.
  4. Food Technology.
  5. Quick Frozen Foods.

CAREER OPPORTUNITIES IN MODERN AGRICULTURE

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Define in writing the terms agribusiness and farming.
B. List 6 factors that make agriculture our largest industry.
C. Write a description of several clusters of agricultural occupations.
D. Appreciate the world's need for agriculture.
E. Be sensitive to the vastness of agriculture in the U.S.A.
F. Trace food and other agricultural products from the producer to the consumer.
G. Identify jobs associated with the production, marketing, and distribution of agricultural products.
H. List 18 types of agencies and companies in Wisconsin that produce, market or distribute agricultural products.
I. Understand how local agribusiness relates to agribusiness in Wisconsin and the nation.
J. Formulate the important steps in preparing for a career in agriculture.
K. Identify 5 sources of occupational information in school.
L. Select 4 sources of occupational literature.
M. Contact local job service office for agricultural career related information and assistance.

II. Concepts to Develop

A. Agribusiness includes farming.
B. Agribusiness is a large, vast and complex industry.
C. Agribusiness has a large number of occupations.
D. A raw product from the farm produces jobs as it is processed and marketed.
E. Many companies provide agricultural opportunities.
F. A good career decision requires planning.
G. One's choice of an occupation decides a great deal about one's lifestyle.

III. Subject Matter to Teach

- A. The agricultural industry-our largest
  - 1. A two way street.
    - a. produces and distributes raw products.
    - b. consumes products produced by other industries.
  - 2. Using current available statistics determine:
    - a. Per cent of population involved in production agriculture
    - b. Number of workers involved in manufacturing and selling farm supplies. (feed, seed, fertilizer, etc.)
    - c. Number of workers involved in processing and distributing of farm products.
    - d. Value of current sales:
      - 1) Cattle and calves
      - 2) Hogs
      - 3) Dairy products
      - 4) Grains and hay
    - e. The amount that farmers spend for production items:
      - 1) Feed and fertilizer
      - 2) Livestock
      - 3) Interest
      - 4) Taxes
      - 5) Fuel
      - 6) Machinery
- B. Agricultural occupations in which people engage:
  - 1. Agricultural production.
  - 2. Agricultural Supplies/Services.
  - 3. Agricultural Mechanics.
  - 4. Agricultural Products (Processing, inspection, and marketing).
  - 5. Ornamental Horticulture.
  - 6. Agricultural Resources.
  - 7. Forestry.
- C. World need for agriuclture
  - 1. World population.
    - a. growth rate.
    - b. number of people.
    - c. location of people.
    - d. location in relation to food production.
  - 2. World land utilization
    - a. crop land.
    - b. grazing land.
    - c. cities, tundra, roads, forest, etc.
    - d. cultivated land available.
  - 3. World levels of food production.
- D. Agriculture in the U.S.A.
  - 1. Agriculture varies widely in the U.S.A.
    - a. dairy.
    - b. wheat.
    - c. corn.
    - d. cash grain.
    - e. cotton.
    - f. tobacco.
    - g. beef-range.
    - h. beef-feedlot.
    - i. forest.
  - 2. U.S. Population.
    - a. total numbers.
    - b. location and density.
  - 3. Getting food from producer to consumer.
    - a. cycle of a product.
    - b. number of jobs.
- E. Agriculture in Wisconsin*
  - 1. Agriculture varies widely in Wisconsin.
    - a. Southeast.
    - b. Southcentral.
    - c. Eastcentral.
    - d. Central.
    - e. Southwest.
    - f. Westcentral.
    - g. Northwest.
    - h. Northcentral.
    - i. Northeast.
  - 2. Types
    - a. General.
    - b. Field crops.
    - c. Livestock and poultry.
    - d. Dairy.
    - e. Speciality crops.
  - 3. Wisconsin Population.
    - a. Total.
    - b. Location and density.
  - 4. Getting food from producer to consumer.
    - a. Trace a product like milk from producer to consumer pointing out other products made from it.
    - b. Number of agriculture jobs.
  - 5. Wisconsin's agribusiness.
    - a. Film-"Agribusiness is Everybody's Business."
  - 6. Companies in Wisconsin that produce, manufacture or distribute an agricultural product or service.
    - a. chemical companies.
    - b. credit agencies.
    - c. dairy companies.
    - d. electric companies.
    - e. cooperatives.
    - f. farm machinery companies.
    - g. feed, seed, and grain companies.
    - h. food stores.
    - i. insurance companies.
    - j. meat packing companies.
    - k. processors.
    - l. public agencies.
    - m. government agencies.

- F. Agriculture in your county, township or school district (make outline similar to the one above using data from census and agricultural statistics).
- G. How to prepare for a career in agribusiness.
  - 1. Planning.
    - a. courses in school.
    - b. talk to resource people.
    - c. job experience.
    - d. talk to parents.
  - 2. Plan for flexibility.
    - a. plan for "clusters" of occupations.
    - b. get education as well as experience.

    *Use latest copy of Wisconsin Agricultural Statistics, Wisconsin Department of Agriculture.
- H. Sources of occupational information.
  - 1. School.
    - a. vo-ag teacher.
    - b. other teachers.
    - c. counselor.
    - d. guidance office.
    - e.
  - 2. Occupational literature.
    - a. dictionary of occupational titles.
    - b. professional and technical schools.
    - c. state employment agencies.
    - d. library.
    - e. periodicals.
    - f. want ads in newspapers.
    - g. special bulletins.
- I. Your occupation determines your life style.
  - 1. car.
  - 2. house.
  - 3. neighborhood.
  - 4. friends.
  - 5. income.
  - 6. education for children.

IV. Motivation

- A. Bulletin board about careers.
- B. Resource people from the community.
- C. Guidance personnel.
- D. Career sheets, career profiles and other factual information about jobs in agriculture.

V. Learning Activities

- A. Map locating local agricultural businesses.
- B. Visit one or more local businesses.
- C. Search want ads for jobs in agriculture.
- D. Map of agriculture in Wisconsin.
- E. Visit with job service office representative concerning job opportunities.
- F. Interview job holders in the community.

VI. References

- A. Books
  - 1. Agriculture In Our Lives, Krebs, Interstate, 1978.
  - 2. Careers in Agribusiness and Industry, Stone, Interstate, 1970.
  - 3. Agriculture Year Books—1960, 1963, 1966, 1969, 1972, 1976.
  - 4. Career Preparation For Agriculture/Agribusiness, Lee Gregg/McGraw-Hill, 1978.
  - 5. Exploring Agribusiness, Ray and Morgan, Interstate, 1975.
  - 6. Books on Careers, National Farm Book Co., Omro, Wis.
    - a. Agriculture - Sextant Series, 1971. National Farm Book Co.
    - b. Career Information, Block, 1976, National Farm Book Co.
    - c. Experience Programs for Learning Vocations in Agriculture, Binkley and Hammonds.
    - d. Careers in Conservation, Clepper, 1979.
    - e. Handbook of Agricultural Occupations, Hoover, 1977.
    - f. An Introduction to Agricultural Business and Industry, Weyant, et al, 1971.
    - g. Supervised Occupational Experience Manual, Carwin, 1971.
  - 7. Exploring Agriculture, Donahue, Evans, et al, Prentice-Hall 1976.
  - 8. Exploring Occupations in Agribusiness & Natural Resources, Curtis, Mercer, Gregg/McGraw-Hill, 1976.
- B. Filmstrips
  - 1. Careers in Agriculture #1-901-130 Vo-Ed Production, Cal. Poly. State Univ. San Luis Obispo, CA 93407
- C. Films.
  - 1. "The Agriculture Story," #3899 BAVI, Madison
  - 2. "Tomorrow's Food Power." Farm Film Foundation. 1425 H. Street, N.W. Washington, D.C. 20005
  - 3. "Agribusiness is Everybody's Business" - #6804, BAVI
  - 4. "Careers in Agriculture," F4406, BAVI
  - 5. "Dynamic Careers Through Agriculture." Farm Film Foundation

6. "It's Up to You ...Choosing a Career," #7410, BAVI
7. "Planning Your Career," #3025, BAVI
8. "Vocations In Agriculutre." #6208, BAVI
9. "Your Earning Power," #2565, BAVI
10. "A Day in Agrichemicals Research", Venard, Box 1332, Peoria, Ill. 61654
11. See: Educators Guide to Free Films, Educators Progress, Randolph, Wis.

CARPENTRY, AGRICULTURAL

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the agricultural carpentry industry and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Perceive the importance of safety when working with hand and power tools.
- C. Calculate bills of material.
- D. Maintain an orderly shop.
- E. Recognize common building materials and hardware and know their uses and limitations.
- F. Be familiar with the nomenclature and standard terminology for building parts.
- G. Understand accepted construction principles.
- H. List and identify the standard types of building designs, and the advantages and limitations of each.
- I. Draw and construct to scale a project of the student's choice.
- J. Recognize and appreciate good craftmanship and construction.

II. Concepts to Develop

- A. There are career opportunities in agricultural carpentry for young men and women at all levels of educational preparation.
- B. A constant awareness of safety is needed by all persons at all times.
- C. Quality materials plus quality construction results in a quality product.
- D. Success in agricultural carpentry is dependent on the skills and techniques mastered by the individuals.
- E. Wood working tools which are in excellent condition are the safest to use.
- F. A neat and orderly shop contributes to a worker's safety and efficiency.
- G. Thorough planning should precede all construction projects.

III. Subject Matter to Teach

- A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
- B. Safety in the agricultural carpentry field
  1. The general safety rules for the shop.
  2. Safety instructions for the use of hand and power tools.
  3. Safety regulations when working with electricity.
  4. Safety concepts and regulations which apply to the occupational field (OSHA).
- C. Tool identification and conditioning
  1. Identification of hand tools.
  2. Identification of power tools and component equipment.
  3. Conditioning and repair of tools and equipment.
  4. Demonstration of current usage.
- D. Bill of materials
  1. What is a bill of materials?
  2. Proper form.
  3. Calculation of board feet.
  4. Calculation of square and running board feet.
  5. Estimating labor requirements.
  6. Computation of costs.
- E. Shop arrangement
  1. Storage facilities for hand and power equipment.
  2. Proper shop usage and layout.
  3. Lumber, metal, and materials storage.
  4. Inventory for equipment and materials.
  5. OSHA standards.
- F. Identification of building materials and their uses.
  1. Characteristics of woods, metals, concrete and other construction materials.
  2. Grades of lumber and defects.

        3. Plywood and other fabricated products.
        4. Wood and metal fasteners.
            a. nails
            b. screws, hinges, and miscellaneous hardware
            c. adhesives
            d. timber connectors
            e. glue
            f. concrete fasteners
            g. bolts
        5. Matched lumber and millwork.
    G. Construction practices
        1. Building nomenclature.
        2. Foundations.
        3. Framing.
            a. sills
            b. joists
            c. plates
            d. subflooring
            e. studding
        4. Framing openings.
        5. Sheathing, siding, flashing.
        6. Roof framing.
        7. Roofing.
            a. materials
            b. applications
        8. Finish.
            a. exterior
            b. interior
            c. floors
            d. trim
    H. Construction principles.
        1. The right material for the job.
        2. State, county, and local codes.
        3. Stress and strength.
        4. Bracing and supports.
    I. Building designs
        1. Names and types of building designs.
        2. Names and type of roof design.
        3. Pole buildings.
    J. Planning the project
        1. Basic drawing and design.
        2. Scale drawing.
        3. Measurement and layout.
    K. Trends in the agricultural carpentry industry

IV. Motivation

A. Field trip to a local lumber company.
B. Field trip to various building sites.
C. Local building contractor class presentation.
D. Bulletin board displays.
E. Slide series on principles of building construction.
F. Slide series of former students' projects.
G. Films and filmstrips.

V. Learning Activities

A. Have students spend one or more days working for or observing a lumber yard, building contractor, saw mill, building inspector, real estate salesman, carpenter, mason, or similar occupation.
B. Conduct a safety check of all shop tools and equipment.
C. Take an inventory of all shop tools and equipment.
D. Design a shop layout plan for each student's home shop or proposed shop.
E. Compile a tool and equipment list for a complete shop along with costs for each item.
F. Collect various types of fasteners and mount them for future use.
G. Construct a simple shop project that develops and measures as many of the various skills as possible.
H. Provide an opportunity for students to evaluate each other's projects.
I. Select and arrange for a large building project, such as a garage, outbuilding, greenhouse, storage shed, or similar building that can be constructed as a class project.
J. Select various projects and have the student determine the cost of materials.
K. Construct scale model buildings on a cutaway design showing the various construction components.
L. Have each student design and construct a project of his or her choice.
M. Cut and construct rafters, stairs, and lay roofing on a scale model.
N. Cut and construct rafters, stairs, and lay roofing, as a part of his/her occupational experience program.

VI. Materials Needed

A. Books:
    1. ABC of the Steel Square - Hodgson - National Farm Book Co.
    2. Black & Decker - Power Tool Carpentry - Daniels & Philbin - National Farm Book Co.
    3. Carpentry & Building Construction - Feirer & Hutchings - Chas. A. Bennett & Co., Peoria, Illinois.
    4. Complete Do It Yourself Manual - Readers Digest - Pleasantville, N.Y. 1973
    5. Construction - Principles, Materials & Methods - Schmidt - Interstate— 1975
    6. Construction and Maintenance for the Farm & Home - Foss - Wiley & Sons — 1960

7. Creating in Wood With the Lathe - Gustavson & Olsen - Nat. Farm Book Co.
8. Estimating for the Building Trades - Steinberg & Stempel - American Technical Society - 5608 Stoney Island Ave. Chicago, Ill.
9. Fix It Yourself Manual - Readers Digest - Pleasantville, N.Y. 1977
10. Framing, Sheathing & Insulation - Jones & Ball - National Farm Book Co.
11. Fundamentals of Carpentry 1 - Tools, Materials, Practices - Durbahn & Putnam - American Technical Society - Chicago, Illinois
12. Fundamentals of Carpentry 2 - Practical Construction - Durbahn & Sundberg - American Technical Society - Chicago, Illinois
13. General Shop Woodworking - Fryklund & LaBerge - McKnight - 1965
14. Modern Carpentry - Wagner - National Farm Book Co.— 1979
15. Modern Woodworking - Wagner - National Farm Book Co. 1974
16. Basic Carpentry - Capotosto - National Farm Book Co. 1975
17. Rafter Layout With The Framing Square for School & Home Workshop - Bear & Hoerner - Hobar Publishing Co. 1234 Tiller Lane, St. Paul
18. Roof Framing - Siegele - National Farm Book Co. 1976
19. Saw Horse Layout With The Framing Square for School & Home Workshop-Bear & Hoerner - Hobar Publishing Co. 1234 Tiller Lane, St. Paul
20. Woodworking for Everybody - Shea - National Farm Book Co. (Paperback)
21. Woodworking - Wagner - National Farm Book Co. 1968
22. Woodworking - Miller-Editor - McKnight - Bloomington, Ill. 61701

B. Miscellaneous Publications:
The following are available from Hobar Publishing Co.
  1. Carpentry Construction Worksheets
  2. Planning Project Construction
  3. Power Tool Safety & Operation

The following are available from Hobar Publishing Co., or Delmar Publications.
  1. Framing, Sheathing & Insulation
  2. Use of Hand Woodworking Tools
  3. Use of Portable Power Tools
  4. Units in Woodworking

C. Slidefilms:
The following are available from Vo-Ag Service, University of Illinois
  1. Circular Saw
  2. Drill Press
  3. Jointer
  4. Portable Electric Saw
  5. Power Grinder
  6. Radial Arm Saw

CHOOSING A CAREER

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Write about six reasons why people work.
B. Define in writing such terms as interest, ability, aspiration, and aptitude.
C. Discover and describe orally some of his/her primary interests, abilities, aspirations, and aptitudes.
D. Analyze and classify work following one of the classification schemes.
E. Relate attributes of self to work by compiling lists of jobs and analyzing for their personal appropriateness.
F. Design a list of factors that one should consider in selecting an occupation.
G. Evaluate one or more jobs using a survey form similiar to the one included with this unit.
H. Formulate a plan that will enable him/her to graduate from high school and seek a job in his/her chosen area or additional education.

II. Major Concepts

A. A person chooses a career-occupation-job based on an intermix of such things as interests, abilities, aspirations, and aptitudes.
B. People work for a variety of reasons.
C. Work is classified.
D. Jobs may be analyzed for their appropriateness for you.
E. Planning to achieve what you want is as important as deciding what you want.

III. Subject Matter To Teach

A. World of Work
  1. World population and U.S.A.- past, present, future
  2. Scope of Agriculture
    a. production
    b. off-farm related to agriculture

B. Reasons People Work
   1. Income
   2. Success
   3. Security
   4. Companionship
   5. Service
   6. Creativity
   7. Working Conditions
   8. Belonging

C. Process of Career Development
   1. Understanding "Self"
      a. interests
      b. abilities
      c. aspirations
      d. aptitudes
      e. values
      f. goals
   2. Understanding the World of Work

D. Common Blind Spots

E. Surveying Occupations-specifically in areas of student interest
   1. Description of the occupation
      a. nature of work
         1. responsibilities, hours, working conditions, location
      b. Attractive features
         1. social status and associations
      c. Undesirable features
         1. strains and hazards
      d. Present outlook
         1. supply and demand
      e. Related fields of work this training would also be helpful for
   2. Requirements of Occupation
      a. Educational training
         - kind, amount, length, expense, school subjects, where to get training
      b. Personal qualifications
         - mental ability, personality, special interests, age, appearance
      c. Physical qualifications
         - demands on health
         - lungs, nerves, vision, etc.
   3. Rewards of occupation
      a. Financial
         1. annual income and pay scale
         2. how paid-salary, commission, wage, etc.
      b. Security
         1. pensions
         2. retirement allowance
         3. insurance
         4. tenure
      c. Personal satisfaction
         1. service to others, prestige, self-expression, demands on family
         2. transfer to related vocations and advancement
         3. vacations and other work benefits

F. Sources Of Occupational Information
   1. Literature-from public library, professional and technical schools, bureau of statistics, civil service, periodicals, and want ads in papers.
   2. Interviews with informed persons
   3. First hand observation
   4. Work experience programs
   5. Resource speakers
   6. Films and slide sets

G. Educational Planning
   1. Develop a high school program for remaining years of schooling to best prepare you for your chosen career
   2. Post high school study and/or work.
   3. Make a list of job clusters that interest you.
   4. Collect information on careers and interview persons.

IV. Motivation

A. Bulletin board display
B. Career Posters
C. Resource people from the community
D. Field trips to factories and farms and talk to workers

V. Learning Activities

A. Community survey to find out why people work.
B. Complete a Sextant Profile.
C. Complete a personal survey of "Self" and a particular career area. (use section C and E as example guides)
D. Interview working parents.

VI. Materials

A. Books
   1. "Exploring Agriculture"—Evans-Donahue, Prentice Hall 1979.
   2. "Handbook of Agriculture Occupations"—Hoover, Interstate 1970.
   3. "Agriculture In Our Lives"—Krebs, Interstate 1978.
   4. "Careers In Agribusiness And Industry"—Stone, Interstate 1970.

B. Pamphlets and Bulletins

1. "Exploring Your Future"-Agriculture Sextant Systems, Inc. P. O. Box 1234 Milwaukee, Wis. 53201
2. "Careers in Agriculture: Your Opportunity" Careers Handbook, The Farmer. 1999 Shepard Road, St. Paul, Minn., 55116
3. "Visions" Land O'Lakes Agricultural Services, Fort Dodge, Iowa.
4. Materials from Colleges of Agriculture and Life Sciences, Madison, Platteville, and River Falls.
5. Materials from statewide technical schools.
6. "Young Dairyman" Hoard's Dairyman, Fort Atkinson, Wis., 53538
7. "Wisconsin Ag Statistices" Department of Agriculture, Trade and Consumer Protection, 801 West Badger Road, Madison, Wis., 53713

C. Films and Filmstrips

1. "Careers In Agriculture" - 8 filmstrips. Vocational Education Productions, California Polytechnical State University, San Luis Obispo, Cal., 93407.
2. BAVI Films, Madison, Wis., 53706.
3. Farm Film Foundation Films, 1425 H. Street, N.W., Washington, D.C. 20005
4. John Deere Film Library, Moline, Illinois
5. Teaching Materials Catalogue (page 9) from Vocational Agriculture Service, College of Agriculture, University of Illinois, 434 Mumford Hall, Urbana, Illinois, 61801.
6. NASCO Agricultural Science Catalogue (page 350 and 351), section on slides and filmstrips, Janesville Avenue, Fort Atkinson, Wis., 53538
7. Career Guidance Films. Modern Talking Picture Service, 2323 Hyde Park Road, New Hyde Park, N.Y. 11042

COMMUNICATIONS, AGRICULTURAL

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in agricultural communications and will be able to relate these factors to his/her own specific needs and aspirations.
B. Initiate a conversation with another person.
C. Analyze clues to nonverbal communication.
D. Follow the correct procedure when using the telephone.
E. Make introductions in different situations.
F. Evaluate the importance of effective communication in developing leadership skills.
G. Take part in group discussion.
H. Lead a group discussion for 15 minutes.
I. Introduce a speaker
J. Discuss the evolution and current status of the agricultural communications industry.
K. Understand the effect of modern agricultural communications on profitable farm management.
L. Identify and list the various media employed in agricultural communications.
M. Understand how to use the "print and broadcast" media in making everyday farm operational decisions (*i.e.*, marketing information, weather information, farm news, and farm product advertising).
N. Recognize the importance of farm advertising in effective farm product marketing.
O. Comprehend the value and practical application of such farm advertising devices as: farm name, farm sign, farm business stationery, display advertising and classified advertising.
P. Understand the basic laws and regulations pertaining to the usage of farm advertising and farm media.
Q. Be familiar with specific agricultural communications media in their respective areas (*i.e.*, farm magazines, daily and weekly newspapers, radio stations, television stations, and names of farm editors and farm directors).

II. Concepts to Develop

- A. There are career opportunities in agricultural communications for young men and women at all levels of educational preparation.
- B. Agricultural communications play a vital role in a successful farm operation.
- C. Specific techniques are needed to improve agricultural communications to and from the farm.
- D. Numerous laws and regulations govern the agricultural communications industry.

III. Subject Matter to Teach

- A. Basic elements of personal communication
  - 1. Sender
  - 2. Channel
  - 3. Receiver
- B. Personal communications include:
  - 1. Letter writing
  - 2. Organizing a short talk to a group.
  - 3. Organizing and presenting a speech.
  - 4. Introducing a speaker
  - 5. Participating in conversations and discussions
  - 6. Using correct telephone procedure
  - 7. Writing a news article
  - 8. Participating in a radio or TV program
  - 9. Reading a persons body language (kinesics)
  - 10. Listening/sensitivity
    - a. Become genuinely interested in others
    - b. Smile
    - c. Remember that, to other person, his or her name is a sweet sound
    - d. Be a good listener; encourage others to talk about themselves
    - e. Talk in terms of the other persons interests
    - f. Make the other person feel important and do so sincerely
  - 11. Greetings
  - 12. Presenting awards
- C. Barriers to successful personal communications—Efforts to communicate are distorted by:
  - 1. The receiver hearing what he expects to hear.
  - 2. The sender and receiver having different perceptions.
  - 3. The receiver evaluating the source incorrectly.
  - 4. Words have different meanings.
  - 5. Ignore nonverbal cues.
  - 6. Receiver emotionally upset.
  - 7. Noise.
- D. Techniques for improved personal communication
  - 1. Feedback
  - 2. Many channels
  - 3. Face-to-face communications
  - 4. Sensitivity to receiver
  - 5. Awareness to symbolic meanings
  - 6. Careful timing—reinforcing words with action
  - 7. Simple language
  - 8. Repetition
- E. Skills for helpful listening
  - 1. Be an effective receiver
    - a. Maintain eye contact
    - b. Have a relaxed but attentive posture
    - c. Follow the sender's statements ("Yes," "I understand," nods, etc.)
  - 2. Interpret feelings
    Understand the following which prompts a statement ('I hate school' may mean I feel scared, rejected, hurt, frustrated.
  - 3. Project acceptance of feelings—use reflecting statements ('In other words....," "what your saying is....")
  - 4. Explore alternatives
    - a. List options
    - b. Assist talker in describing and measuring impact of each
- F. Non-Verbal distractors of speakers
  - 1. Swaying—moving without purpose
  - 2. Riding the podium
  - 3. Playing with coins or keys in your pockets
  - 4. Nervousness habits—fidgeting
- G. Non-Verbal personal communication
  - 1. Facial expression cues
  - 2. Posture cues
  - 3. Hand and arm gestures
  - 4. Body movement cues
  - 5. Eye contact
  - 6. Lack of verbal communication—pause—silence
  - 7. Overall appearance as it affects different audiences
- H. Tips on conversing in a formal setting
  - 1. Be interested and interesting
  - 2. For topics use the F-O-R formula (Family—Occupation—Recreation...and don't forget Mr. Dependable the weather)
  - 3. Don't make your small talk too small

   4. Be a good listener and good conversationalist
   5. Don't engage your mouth until your mind is in gear

I. Optional areas of communication awareness
   1. Utilize public speaking techniques.
      a. Use the public speaking unit in the FFA
   2. Expose yourself to opportunities of presenting extemporaneous and impromptu speeches.
   3. Build confidence by being involved in small group settings, clubs, committees, etc.
   4. Become involved in parliamentary procedure and other conduct of meeting guidelines. (refer to parliamentary unit in this publication)
   5. Be aware of human relations information and job interviewing techniques. (refer to human relations unit in this publication)

J. Introduction to the agricultural communications industry
   1. History.
   2. Scope (current).
      a. Newspapers.
      b. Radio and TV stations.
   3. Effect upon modern agriculture.
      a. Farming and ranching.
      b. Agribusiness firms.
   4. Effect upon the general public.
      a. Consumers.
      b. Government.
   5. Media
      a. Print.
      b. Broadcast.
      c. Others ("word of mouth," signs, exhibits, and demonstrations).
   6. Benefits
      a. Current market information.
      b. Farm news (help make management decisions).
      c. Weather status and predictions.
      d. Aid to selling and buying (farm products and farm equipment).
      e. "An informed public is a willing public."

K. Farm advertising as a communication tool
   1. Historical background.
   2. Relation to agricultural marketing.
   3. The Five "M's" of agricultural advertising.
      a. Market.
      b. Motives.
      c. Media.
      d. Message.
      e. Measurement.
   4. Psychology of sales.
      a. Sales theories.
      b. Steps of a sales campaign.
      c. Handling different types of customers.
   5. Advertising devices.
      a. Farm name.
      b. Farm sign.
      c. Farm business stationery.
      d. Displays and signs.
      e. Exhibits and demonstrations.
      f. Classified ads.
   6. Advertising campaigns.
      a. Audience selection.
      b. Media selection.
      c. Timing.
      d. Costs.
      e. Use of outside advertising agency.
      f. Evaluation.
   7. Laws and regulations
      a. Truth.
      b. Bad taste.
      c. Lottery.
      d. Right of privacy.
      e. Libel.
      f. Copyright.
      g. Trademarks.

L. Careers
   1. Career and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

M. Trends in the agricultural communications industry.
   1. Personnel.
   2. Training requirements.
   3. Technological advances.
   4. Effects upon production farming and agribusiness.

IV. **Motivation**

A. Field trips to local weekly newspapers, daily newspapers, radio and television stations and advertising agencies.

B. Observation of or actural participation in a radio or TV farm broadcast.

C. Class presentation by a resource speaker representing the press and broadcast media.

D. Movies or sound film strip-slide presentations on agricultural communications.

E. Bulletin board displays.

F. Literature from Wisconsin Press Association and the National Association of Farm Broadcasters, etc.

V. Learning Activities

A. List five topics you can use to begin a conversation.

B. Write two clues that indicate a person is ready to continue a conversation.

C. List three skills you can use for effective listening.

D. Demonstrate orally two ways of properly introducing one person to another.

E. Express and interpret the following nonverbal messages:
  1. Shrug of shoulders
  2. Tears
  3. Frown
  4. Look at watch
  5. Smile
  6. Raised eyebrows
  7. Clenched teeth
  8. Yawn

F. Role play correct and incorrect telephone conversations.

G. List three ways in which you can contribute to a group discussion.

H. Explain the responsibilities you will have as a discussion leader.

I. Sample introductions from individuals in a group given a sheet of information on a hypothetical speaker, followed by critique by class members.

J. List all local agricultural communications media in the area including the names of key contact persons with each of the specified media.

K. Deliver a speech or write a short paper on the history and current status of communications in agriculture.

L. Interview a member or members of the print or broadcast media to find out about job opportunities, qualifications for position, course preparation, working conditions, advantages and disadvantages of the job.

M. Write a classified ad advertising an actual farm product (examples - a used farm machine, hay, herd sire, calves, wood, land).

N. Choose an official name for their parent's farm or own future farm. Check regulations to learn how a name is protected by registering it with the County Register of Deeds.

O. Design an appropriate and attractive letterhead for official farm stationery.

P. Write a business letter promoting a product, requesting information, or other appropriate simulated or actual practical exercise involving agriculture using proper format and style.

Q. Design and construct an attractive farm sign using the farm name.

R. Outline a detailed advertising campaign to promote a farm product (i.e., purebred stock, cash crops like honey and wood, recreational use of the land like snowmobile trails, hunting, etc.). Select the media, design the message and finally evaluate the campaign. Note: for purebred stock example, first select an appropriate prefix to identify the herd.

S. Set up an exhibit or demonstration promoting an agricultural product or other agricultural subject.

T. Write news releases in class about community agricultural events, submit to local newspapers and radio/TV stations.

U. List professional agencies agricultural communicators can affiliate with and provide background information about each organization.
Examples:
ARC- Agricultural Relations Council
AAEA- American Agricultural Editors Association
AAACE- American Association of Agricultural College Editors
NAFB- National Association of Farm Broadcasters
NFEA- National Farm Editors Association
WPA- Wisconsin Press Association

VI. Materials Needed

A. *Books*
  1. *Advertising and Promotion.* Class Unit (Student Manual and Teacher's Guide), AGDEX 920/40, Ohio Agricultural Education Curriculum Materials Service, 1971.
  2. *Agricultural Salesmanship* Unit 4. Student's Manual, William Losher, Owosso, Michigan, 1969.
  3. *Agriculture* -Sextant Series (75 agriculture job opportunities), 1971.
  4. *Agri-Industry Careers.* (Lesson Plan #15 - "Communicating in the Agricultural Field"), Successful Farming Vo-ag Teaching Unit, 1970.
  5. *Careers in Agribusiness and Industry.* Interstate, 1970.

6. *Career Information*, Block, 1971.
7. "Developing Communication Skills In Non-Committed Learners." Parker Publishing Company, West Nyack, New York. 1970
8. *Handbook of Agricultural Occupations*, Hoover, Interstate, 1977.
9. *Selling and Salesmanship*, Class Unit (Student Manual and Teacher's Guide), Ohio Agricultural Education Curriculum Materials Service, 1971.
10. *The Five M's of Agricultural Advertising*. Douglas Sorenson, University of Wisconsin Press, Madison, 1967.

B. Pamphlets & Booklets

1. "FFA Leadership and Personal Development Series", P.O.Box 15159, Alexandria, Virginia, 22309 1978. No. 4,5,9, & 10.
2. "Washington Conference Program—Personal Communication Skills", Session 1,2, & 3, National FFA Center, Box 15160, Alexandria, Virginia, 22309. 1978
3. "Reporters Handbook", National FFA Supply Service, P.O. Box 15159 Alexandria, Virginia, 22309. 1977
4. "Leadership for Agricultural Industry", Stewart. Personal Communications, Group Discussion. Gregg Division, McGraw-Hill Book Co. Manchester Road, Manchester Missouri, 63011. 1978
5. "Student Handbook—FFA", Becoming a Chapter Leader—Communication Skills. (PP. 72-73) National FFA Supply Service, P.O. Box 15159 Alexandria, Virginia, 22309 1977
6. "Some Things to Remember in Presenting A Radio Program"—"Some Things To Remember In Presenting A TV Program". WAVAI Madison Area Radio & TV Committee, Richard Miller chairmen, 401 South Randall Ave. Janesville, Wis. 53545

C. Directories

1. *Directory and Rate Book-Wisconsin Newspapers*. Wisconsin Press Association, Madison, current edition (revised annually). Note: 2 directories avaliable-dailies and weekly & semiweekly.
2. *Directory of Communicators in Agriculture*. Agricultural Relations Council, Chicago, current edition (revised periodically).

D. Visual aids

1. "Agricultural Communications in the U.S.A.," Slide Set, No. A-19, USDA, 1965.
2. "Better Half of Farming," New Holland.
3. "Classified — Everyone's Market Place," Copley Productions.
4. "Farm Letterheads," Slide set, University of Wisconsin Department of Agriculture Journalism.
5. "Farm Signs," Slide Set, University of Wisconsin Department of Agriculture Journalism.
6. "Look at Education Exhibits," BAVI
7. "Look Who's Talking," American Dairy Association.
8. "Newspaper Serves Its Community," BAVI.
9. "Television in Your Community," BAVI.
10. "Pictures the Thing,"Association Films.
11. "Promoting Lamb and Wool," Sterling Movies.
12. "Salesmanship in Agriculture Business," slide film No. 391, VAS, University of Illinois.
13. "The Golden Standard," Modern Talking Pictures or Audit Bureau of Circulations.
14. "USDA Information for All," slide set, No. A-8, USDA, 1965.
15. "Who Wrote That," Association Films.
16. Communications Subject Listing, Modern Film Rentals, a division of Modern Talking Picture Service, Inc. 2323 New Hyde Park Road, New Hyde Park, N.Y. 11040
17. Communications Subject Index, Pyramid Films, Box 1048, Santa Monica, California, 90406
18. Language Arts, Communication Skills (subject heading), McGraw-Hill Films, Dept. 455, 1221 Avenue of the Americas, New York, New York 10020
19. Title Listing—Communications. A Reference List of Audiovisual Materials produced by the United States Government, General Services Administration, National archives and Records Service, National Audiovisual Center, Washington, D.C. 20409

20. Subject/Utilization Heading—Communications and Communications History, Audio-Visual Center, Indiana University, Bloomington, Indiana 47401
21. Film Subject Index—Communications, Bureau of Audio Visual Instruction, University of Wisconsin—Extension, 1327 University Avenue, P.O. Box 2093, Madison, Wisconsin 53701

CONCRETE INDUSTRY

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the concrete industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Summarize in writing the history, manufacture and types of portland cement.
C. Comprehend the fundamental relationships between cement, water and aggregates.
D. Explain the properties desired in plastic and hardened concrete.
E. Describe the types and uses of concrete.
F. Understand the standard tests used to determine the quality of concrete.
G. Discuss the methods of specifying ready-mixed concrete for specific uses.
H. Explain the proper use and care of tools used to place and finish concrete.
I. Determine the amount of concrete needed for a job.
J. Use proper placing procedures under various weather conditions, including use of reinforcement, finishing techniques, and control joints.
K. Employ proper concrete masonry construction techniques.

II. Concepts to Develop

A. There are career opportunities in the concrete industry for young men and women at all levels of educational preparation.
B. A knowledge of the history, manufacture and types of portland cement is helpful in understanding the current uses of concrete.
C. The making of quality concrete begins with the proper relationship of cement, water, aggregates and additives needed to suit all weather conditions and special uses.
D. Ready-mixed and job-mixed concrete quality can be determined by standard tests.
E. The proper estimating of concrete needs is necessary for economical concrete construction.
F. When proper equipment is combined with quality concrete and recommended placement, finishing, and curing techniques are followed, a desirable outcome can be expected.
G. Concrete masonry is widely used in the construction of buildings.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs.
    2. Job description.
    3. Training requirements.
    4. Working conditions.
    5. Opportunity for advancement.
    6. Other factors relating to student needs and aspirations.
B. Historical background of the Portland cement and concrete industries.
C. Basic information about concrete
    1. Cement, water, and aggregates.
    2. Mixing procedure
    3. Additives
        a. Air entrainment agents
        b. Calcium chloride
        c. Others
    4. Standard quality tests
D. Uses of concrete
    1. General agriculture uses
    2. Special uses
E. Concrete estimating
    1. Ready-mixed concrete
    2. Job-mixed concrete
F. Placing and finishing concrete
    1. Tools needed
    2. Forming
    3. Reinforcement
    4. Finishing and curing procudures
G. Concrete masonry construction
    1. Mortar mixes
    2. Block placement
    3. Special reinforcement
    4. Joint finishing

IV. Motivation

A. Field trips to a ready-mix plant and a construction site
B. Films and filmstrips on the concrete industry
C. Bulletin board displays

V. Learning Activities

- A. Occupational experience program
- B. Calculate the amount of cement and aggregates needed for a concrete driveway.
- C. Laboratory exercise to include mixing, quality testing, placing, finishing, and curing of concrete.
- D. Special projects - school or home.

VI. Materials Needed

- A. Books:
  - 1. Advanced Masonry Skills - Krek - National Farm Book Co.
  - 2. Concrete and Concrete Masonry - Hobar Publications -1234 Tiller Lane - St. Paul, Minn. 55112
  - 3. Concrete Block Construction - Putnam - National Farm Book - 1970
  - 4. Construction: Principles, Materials and Methods - Schmidt, Lewis, Olin, 3rd Edition - National Farm Book Co. 1975
  - 5. Masonry Simplified - Volume I - Tools, Materials and Practice - Dalzell and Townsend - 3rd Edition - National Farm Book Co. 1973
  - 6. Masonry Simplified - Volume II - Practical Construction - Dalzell and Townsend - National Farm Book Co.
  - 7. Mechanics in Agriculture - Phipps - 2nd Edition - Interstate - 1967
  - 8. Modern Agricultural Mechanics - Wakeman - Interstate - 1977
  - 9. Modern Masonry - Kicklighter - National Farm Book Co.
- B. Booklets and Pamphlets:
  - 1. Concrete Improvements for Farm & Home - Vo-Ag Service, College of Agriculture, University of Illinois, 434 Mumford Hall - Urbana, Ill.
  - 2. Quality Concrete Manual - Hobar Publications - St. Paul Minn. 55112
  - 3. Concrete Construction Worksheets - Hobar Publications.
  - 4. Randolph Slatted Floor Systems - Randolph Concrete Products Inc. Randolph, Wisconsin 53956
- C. Slide Films:
  The following are available from Vo-Ag Service, College of Agriculture, University of Illinois, 434 Mumford Hall, Urbana, Illinois,
  - 1. Laying concrete Masonry Units
  - 2. Planning & Preparing for Concrete Masonry Construction
  - 3. Special Concrete Masonry Problems

  The following are available from the Agricultural Engineering Dep't., Iowa State University, Ames, Iowa:
  - 1. Laying Concrete Masonry
  - 2. Planning, Finishing and Curing Concrete Slabs
  - 3. Selecting, Proportioning & Mixing Materials for Quality Concrete

CONSERVATION

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in conservation and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Describe the role of agriculture in conservation.
- C. Compare the natural and agricultural systems.
- D. List the methods necessary to maintain artificial systems.
- E. Relate the "use, not abuse" philosophy to natural resources.
- F. Analyze agriculture's contribution to environmental problems and prepare one solution for each problem.
- G. Explain orally why farmers should be concerned with their pollution problems.

II. Concepts to Develop

- A. There are career opportunities in conservation for young men and women at all levels of educational preparation.
- B. Agriculture is a part of the total environmental system.
- C. Agriculture plays a part in environmental destruction.
- D. Agriculture is an artificial system and thus must rely on artificial supports.
- E. Farmers need to be concerned about environmental pollution.
- F. Agriculture contributes to our resource problem of siltation and fertility.

III. Subject Matter to Teach

- A. Career
  - 1. Current and future employment needs.
  - 2. Job description.

   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

B. Agriculture is an unbalanced and artificial system
   1. Natural vs. agricultural system.
      a. Natural system.
         1) Great plant and animal diversity.
         2) Natural enemies of each plant and/or animals are present.
         3) Stronger living organisms (weeds can withstand drought much better than corn).
      b. Agricultural system
         1) Monoculture: same variety grown throughout region, thus subject to weaknesses
            a) 1973 southern corn leaf blight struck Texas male-sterile strain
            b) lack of wildlife in pine plantation
         2) Few natural enemies of pests are present (we spray with pesticides thus eliminating "good" and "bad" insects).
         3) Since the agricultural system is based on economics, we must have a maximum production in a given space - not true in a natural system.
   2. Methods used to maintain the artificial unbalanced agricultural system.
      a. Tillage.
      b. Pesticides.
      c. New varieties.
      d. Fertilizers due to the economic nature of agriculture and the demand for food.

C. Philosophy of agriculture towards the environment
   1. Over-reaction: Many agriculturists have over-reacted to criticism of farming methods.
   2. Use-not-abuse: Agriculturists need to develop the philosophy of using properly the natural resources at their disposal and not abusing them. Is a farmer who drains a marsh to increase feed grain payments actually using his natural resources - or is he abusing them?

D. Agricultural contributions to environmental problems
   1. Land runoff.
      a. Siltation.
      b. Fertility.
      c. Pesticides.
      d. Soil destruction.
      e. Some solutions.
         1) proper soil and water conservation practices.
         2) Keep class V and VIII land in vegetative cover.
         3) Maintain 20 feet of "filter cover" (grasses) between fields and streams.
         4) Use proper amounts of fertilizers and pesticides.
   2. Feedlot (barnyard) runoff.
      a. Can cause many problems, (i.e., fertilize lakes and streams).
      b. May contaminate water with disease organisms which can become a public health problem.
      c. Some solutions.
         1) Plan location of feedlots
         2) Construct proper holding areas until manure can be put on the land (recycle).
         3) Fence animals from stream if near to barnyard.
         4) Maintain a "cover filter" if barnyards are near stream or lake.
         5) Relocate yards if practical.
   3. Ground water pollution.
      a. Contamination of wells.
      b. Normally a problem with high concentration of cattle possible from high nitrogen applications to soil but not proven yet.

c. Is often a problem where subsoil is underlain by limestone - which does not filter ground water.

d. Some solutions.
   1) Regular removal of manure.
   2) Concrete or pave areas of high manure concentration.
   3) Proper location of feed lots before construction.
   4) Storage of manure in water tight structures.

4. Pesticides
   a. May affect non-target wildlife species.
   b. May contaminate water supplies.
   c. May injure farmer during application.
   d. May build up residue in food supply.
   e. You can:
      1) Follow label directions.
      2) Only apply when absolutely necessary.
      3) Dispose of containers properly.
      4) Use proper protective equipment.
      5) Select "single target" chemicals where possible.
      6) Select chemicals which break down easily, and with low residues.
      7) Proper conservation practices which reduce runoff will reduce pesticide contamination of streams and lakes.
      8) Rotate crops - reduces the need for fertilizers and pesticides.
      9) Increase the use of biological controls or agricultural pests.

5. Sewer sludge as a fertilizer
   a. Completes the natural cycle of nutrients
   b. Provides water and nutrients
   c. Local supply should not include heavy metals of industries
   d. Precautions should be taken on foods for humans.

6. "Clean farming" may eliminate wildlife.
   a. Mowing or burning fencerows removes travel lanes and nesting sites.
   b. Draining potholes and straightening streams disturbs cover.
   c. Spring plowing and fenced stream banks reduce erosion.

7. Odors, rodents, other nuisances
   a. Farmers near some housing developments have been forced out of business for these reasons.
   b. Solutions: removal of manure regularly, not spreading manure near road, proper sanitation, judicious use of rodenticides and insecticides, proper drainage or reduce standing water areas.

IV. Motivation

A. Field Trips
   1. Farms using good erosion and pollution controls
   2. Stream or lake polluted by agriculture run-off, pH, nitrate, phosphate tests

B. Resource Speakers
   1. DNR Environmental Protection
   2. Soil Conservation Service
   3. Game manager
   4. County planner
   5. Public health official
   6. Zoning enforcement offices

C. Films, filmstrips and slides
   1. "Wisconsin Wetlands," UW-Extension slides

D. Bulletin Board Displays
   1. List plant and animal species found in the natural vs the agricultural system.
   2. Display pictures and life cycles of natural enemies of plant and animal species
   3. Display and list uses of pesticide labels.

V. Learning Activities

A. Design a feedlot which includes safeguards to prevent erosion.

B. Collect and test water samples to determine its suitability for drinking.

C. Display equipment used to protect a person who handles and applies pesticides.

D. Discuss the research results of using sewer sludge as a fertilizer locally and nationally.

VI. Materials Needed

A. Books
  1. Leopold. *Sand County Almanac*, Ballantine, 8th printing, 1974.
  2. Andrews. *Environmental Pollution*. Prentice-Hall, 1972.
  3. Dasmann. *Environmental Conservation*. Wiley and Sons, Inc., 1964.
  4. Tillotson. *Patterns for Preservation*. National Farm Book Co., 1969.
  5. Budd. *Pesticides and the Living Landscape*. UW Press, 1964.

B. Bulletins and Pamphlets
  From the UW-Extension Bulletin Room
  1. "Controlling Waterweeds."
  2. "Land Use Planning Films." Preliminary Report, Entine
  From the SCS Office
  1. "Planning Wildlife Conservation." J.S. 206
  2. "Our American Land." Bulletin 321
  From the Fertilizer Institute, Washington, D.C. 20036
  1. "Our Land and Its Care."

C. Films
  F. From BAVI, UW-Madison
  1. "Run-off: Water Quality and Land Use", 1765
  2. "Conservation and Balance in Nature", 6443
  3. "Cry of the Marsh", 7350
  4. "Environment", 0586
  5. "Man's Impact on His Environment", 2996
  6. "Multiply and Subdue the Earth", 7482
  7. "Tragedy of the Commons", 8657

COOPERATIVE EDUCATION PROGRAMS

I. Performance Objective

Upon completion of this unit, the student will be able to:

A. Demonstrate competency in the area of vocational agriculture/agribusiness in which he/she has been placed.
B. Exhibit an understanding of the world of work and its relationship to classroom instruction.
C. Relate successfully to the employer, supervisor, fellow employees, the coordinator, and classmates.
D. Demonstrate leadership abilities in the classroom, on the job, and in FFA activities.
E. Demonstrate the ability to communicate effectively, whether oral or written.
F. Understand the broad scope of agriculture/agribusiness with all its diversity and numerous employment possibilities.
G. Demonstrate the ability (1) to think, (2) set goals and work toward those goals, and (3) to make decisions.
H. Be familiar with the educational and employment choices available upon graduation.
I. Develop good work habits and attitudes in the classroom and at the coop training station.
J. Develop the ability to work cooperatively with others as well as individually.

II. Concepts to Develop

A. School experiences, especially Cooperative Education, are valuable in preparing the student for his/her career.
B. Many of the skills and competencies needed for successful entry into the job market can be acquired in vocational agriculutre/agribusiness.
C. Cooperative education is a joint effort involving the student, the teacher, the parent, and the employer.
D. Human relations in life are as important as knowledge and skill for job survival and advancement.
E. One's attitude towards their work, supervisor, and fellow employees must be positive to be happy and successful.
F. The ability to communicate is very essential to success on the job. Those who communicate well are those who achieve the highest.
G. Good leadership skills developed in FFA are needed in all phases of agribusiness management.
H. Training in vocational agribusiness prepares a person for virtually unlimited employment opportunities and flexibility.
I. Decision-making ability is crucial in our highly technological agricultural industry.
J. Goal setting is a means of achieving many of the personal and business objectives a person may have.
K. Cooperative training provides entry level skills and learning should be a life long process whether achieved through formal or informal educational means.

L. Work habits and attitudes are formed while in school and often transfer to the world of work.

M. While many tasks on a job may be accomplished on an individual basis, many tasks must be accomplished on a cooperative basis working with others.

III. Subject Matter to Teach

A. Introduction: Cooperative education course subject matter is dependent upon the needs of the community. Hopefully, course content will reflect the types of occupational areas for which the student will be preparing. Never the less, while agricultural subject matter will vary considerably from one community to the next, many basic instructional areas must be considered essential in preparing students for the world of work.

B. Basic Core Instructional Subject Matter
   1. Career Opportunities
   2. Educational Opportunities
   3. Agricultural Communications
   4. Agricultural Leadership (FFA)
   5. Human Relations
   6. Record Keeping

C. Agricultural Subject Matter. Emphasis should be placed on agribusiness management. Individual units during this capstone experience should be advanced instruction building upon the feeder course offerings.

Cooperative training instruction must be of two types: (1) group instruction and (2) individual instruction. For instance, a student placed on a farm would be involved in studying different subject matter during a portion of the course than the student placed in a horticultural occupation.

For aid in developing individual subject matter, consult the appropriate subject area of this curriculum guide.

IV. Motivation

A. Field trips to the coop training stations, educational instructions, banks, and other related industry.

B. Individual Resource Materials for the specific occupation involved.

C. Slides, filmstrips, films, games.

D. Class cooperative projects in marketing, sales, special events, and other FFA activities.

E. Individual and group instructional techniques.

IV. Learning Activities

A. Public Speaking

B. Student Demonstrations

C. Class sales activity

D. Ag. Marketing game

E. FFA Judging Contest

F. FFA week promotional activity

G. other activities specific to career area

VI. Materials Needed

A. Books
   1. *Succeeding in the World of Work*, Grady Kimbrell and Ben S. Vineyard, McKnight Publishing Company, 1975
   2. *Courses of Study for Cooperative Training* (individual study guides) Vocational Instructional Services Texas A & M University, College Station, Texas
   3. *Introduction to Agribusiness Management*, 2nd Edition, McGraw Hill Publishers, Interstate, 1979

B. Bulletins and Pamplets
   1. Succeeding on Your First Job Series
      Ohio Curriculum Materials
   2. Agribusiness, Is it for Me?
      Ohio Curriculum Materials
   3. Agricultural Business Procedures and Records
      Ohio Curriculum Materials

COOPERATIVES

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in cooperatives and will be able to relate these factors to his/her own specific needs and aspirations.

B. Contrast the four methods of doing business under the free enterprise system.

C. Define the term cooperative.

D. Discuss past and present examples of cooperative activity.

E. Discuss the extent of cooperative activity in today's business world.

F. Explain three basic principles that make a cooperative different from all other types of business.

G. Comprehend the philosophy that each member has one vote in a cooperative.

H. Explain the reasons why people invest money in the individual proprietorship, partnership, corporation and cooperative.
I. Describe how earnings resulting from business activity are distributed.
J. Outline the tax responsibilities of cooperatives.
K. Compare the different types of farmer cooperatives.
L. List and discuss some of the reasons why farmers have organized cooperatives.
M. Relate how cooperation affects our daily lives at home, work and at school.
N. List and discuss what farm supplies can be purchased through cooperatives, what products can be marketed through cooperatives and what services are available from cooperatives or mutual enterprises.
O. Discuss the volume of business and total membership of farmer cooperatives in the state.
P. Explain how a farmer cooperative is controlled.
Q. Understand how the chain of ownership operates from farmer members to local, regional and national cooperatives.
R. Distinguish between a centralized and a federated type of cooperative.
S. List and discuss the responsibilities of the board of directors.
T. Explain how cooperatives are financed.
U. Comprehend how savings or earnings are distributed to patrons.
V. Discuss how farmer cooperatives are taxed by the government.
X. Explain how a share of voting stock can be earned.
Y. Describe the election process of the officials of a cooperative.
Z. Discuss the duties of a manager and the board of directors.
AA. List and discuss the reasons why some farmer cooperatives have failed.
BB. Explain the principal factors which contribute to the success in a farmer cooperative.
CC. Describe the chain of ownership in a farmer cooperative.
DD. Distinguish between dividends and patronage refunds.

II. Concepts to Develop

A. There are career opportunities in cooperatives for young men and women at all levels of educational preparation.
B. A cooperative is people organized for business purposes to serve themselves.
C. Cooperatives pay all types of taxes.
D. A cooperative is essentially an organization of people working together.
E. A cooperative is one of four ways that private enterprise organized to do business in America.
F. The net earnings of a cooperative are returned to the patrons or users in proportion to business done with the cooperative.
G. When people use the services of a cooperative, they help themselves and their fellow members.
H. The legal ownership of a cooperative is vested in its members.
I. Only a small portion of the business done in the United States is the result of cooperative activity.
J. Farmers join and patronize a cooperative primarily to help themselves make more money.
K. One of the distinguishing characteristics of a cooperative is democratic control.
L. The responsibility for being informed about the financial structure and services available rests with each member.
M. Cooperatives need loyal members.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.
B. Historical background.
   1. Informal cooperative activities of the pioneers.
   2. Persons involved in the cooperative movement.
   3. Principles identified of the Rochdale pioneers.
   4. Cooperative activity in the United State.
   5. Cooperative activity in Wisconsin.
   6. Origin and extent of cooperative activity at the local and county level.
C. Business organizations in the free enterprise system
   1. Methods used for providing goods and services to people.
   2. Principles that distinguish a cooperative form from other types of business.
   3. Examples of business organizations found in the community and reasons for establishing these businesses.

    4. Reasons for investing money in the various types of businesses.
    5. Rationale for organizing a cooperative.
- D. Organization of the cooperative
    1. Different types of farmer cooperatives.
    2. Purpose of each type of cooperative.
    3. Procedure to use in organizing the cooperative.
    4. Benefits to the community resulting from each type of cooperative.
    5. Scope and volume of business of each type of cooperative.
- E. Extent of cooperative business activity
    1. Principle activities carried on by farmers through their cooperatives.
    2. Total dollar volume resulting from cooperative activity.
    3. Number of farmer cooperatives in the state. In the nation.
    4. Our state's rank in the volume of business and number of members.
- F. Cooperative governing structure
    1. How cooperatives are controlled.
    2. How farmer cooperatives are operated.
    3. Chain of ownership and control from farmer members to local, regional and national cooperatives.
    4. Comparison of a centralized and a federated type of cooperative.
    5. Responsibilities of the board of directors - when and how elected.
    6. Responsibilities of the officers of a cooperative, when and how elected.
    7. Selection of a manager and employees.
    8. Reasons why some cooperatives have failed.
- G. Financing cooperative
    1. Define revolving capital.
    2. Types of stock.
    3. Certificates of indebtedness.
    4. Banks for cooperatives.
    5. Commercial banks.
    6. Other sources.
    7. Payment of dividends.
    8. Taxes paid by cooperatives.

IV. Motivation

- A. Films, filmstrips and slides.
- B. Bulletin board displays.
- C. Field trips to local cooperatives.
- D. Class presentation by a cooperative manager, members of the board of directors or members.
- E. Charts
- F. Arrange for a tour to a large regional cooperative with special emphasis on career in cooperatives.

V. Learning Activities

- A. Occupational experience in a local cooperative business.
- B. Compile a list of cooperatives found in the community and classify each as a service, marketing, purchasing or supply business.
- C. Compile a list of career opportunities that can be found in cooperatives, in agriculture, insurance, finance, health care, housing, consumer goods, and services, and other fields.
- D. Compile a list of types of services performed by cooperatives such as marketing dairy products, grain, selling farm supplies.
- E. Have students present a short skit portraying an annual cooperative meeting including the use of correct parliamentary procedure.
- F. Students write up and present a report to the class on a youth camp or conferences they have attended.
- G. Interview a manager of a cooperative, a manager of a corporation, a member of a partnership, and an owner of an individually owned business to find out how these businesses operate.

VI. Materials Needed

- A. Books, Booklets
    1. *Careers in Cooperatives*, Cooperative League.
    2. *Cooperative Growth, Trends, Comparisons, and Strategies.* Farmer Cooperative Service, U.S. Dept. of Agriculture, Room 1474, South Building, Washington, D.C. 20250.
    3. *Cooperatives in Our Private Enterprise System.* American Institute of Cooperation, 1200 17th St., Washington D.C. 20036.
    4. *Cooperatives, Principles and Practices*, A1457, Schaars. University of Wisconsin - Extension. June 1975
    5. *Foreign Trade*, Farmer Cooperative Service.
    6. *Four Methods of Doing Business*, FELCO, Fort Dodge, Iowa.
    7. *How We Organize to do Business in America*, The Cooperative League.
    8. *Taxes - Cooperatives Have Them Too*, The Cooperative League.
    9. *Teaching Outline in Cooperatives*, The Cooperative League.

10. *You're Off - The Farm Business*, Cooperative League.

B. Films
  1. "An A For The BC Way". - Farm Credit Administration, Washington, D.C.
  2. "As Consumers We're Owners." - Midland Cooperatives, Inc., 739 Johnson Street, N.E., Minneapolis, Minn. 55413.
  3. "Credit Where Credit Is Due." - Farm credit Administration.
  4. "Economics of Democracy." - Midland Cooperatives.
  5. "Help Yourself To Ownership." - Midland Cooperatives.
  6. "Men of Rochdale." - The Cooperative League of the USA, 59 E. Van Buren Street, Chicago, Illinois 60605.
  7. "Strawberries - With Cream." - The Cooperative League of the USA.
  8. "The REA Story." - Farmer Cooperative Service.
  9. "This Business Called a Co-op." Farmers Union Central Exchange, P.O.Box G, St. Paul, Minnesota 55075.
  10. "This Is A Cooperative." - The Cooperative League of the USA.
  11. "Where People Count." - Midland Cooperatives.
  12. "Milk Marketing Today." Film Department, Wisconsin Dairies, Baraboo, 53913
  13. "Profiles of a Director." Production Credit Association or Farm Credit Administration. Midland Cooperatives.
  14. "Cooperatives, the Farmer's Way." Lake-to-Lake Dairy Cooperative, Manitowoc, Wisconsin. Midland Cooperatives.

CORN PRODUCTION

I. Performance Objectives

Upon completion of this unit the students will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the corn industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Identify the different types of corn.
C. Locate on a map the corn growing areas in the county, state and nation.
D. Select seed adapted to his growing area.
E. Contrast different methods of hybrid seed corn production.
F. Develop a fertilization plan for corn production on the home farm.
G. Develop a plan for the use of herbicides, insecticides and fungicides for the home farm.
H. Discuss the different methods of harvesting and storage.
I. Select cultural practices needed for a successful corn crop.
J. Explain the marketing channels available to producers.

II. Concepts to Develop

A. There are career opportunities in corn production for young men and women at all levels of educational preparation.
B. Corn is the most valuable crop grown in the United States.
C. Corn is used in a multiple of ways including feed for livestock, for human food and for commercial uses.
D. Hybrid corn represents the most important single advance in corn production since it has been grown by people.
E. Several methods are utilized in the production of hybrid corn.
F. A successful corn crop is the result of carefully followed approved practices and judicious management.
G. Corn is marketed in several ways.
H. Climate conditions and soil fertility are more important in growing corn than in growing any of the important cereals.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.

B. Introduction to corn
  1. Types of corn.
  2. Uses of corn.
  3. Growing areas.
    a. Corn belt state
    b. Other high producing states
  4. Amount of corn grown.
  5. Climatic and soil requirements.
  6. Corn growth and development.
  7. International implications, distribution and trade.

C. Seed corn selection
  1. Hybrid production.
    a. Systems.
    b. Relative maturities.
    c. Variety selection.
      1) Silo corn and crib corn.
      2) Commercial production.

D. Corn culture
  1. Methods of seed bed preparation.
  2. Fertilization.
  3. Planting.
  4. Weed control.
    a. Chemical.
    b. Cultivation.
  5. Insect control.
  6. Disease control.
  7. Harvesting.
    a. Silage.
      1) How fine to chop.
      2) How to preserve.
      3) What happens in the silo.
      4) Use of corn silage additives.
    b. Grain.
  8. Storage methods
    a. High moisture corn
    b. Drying corn
    c. Crib corn

E. Marketing
  1. Local markets.
  2. International markets.

IV. Motivation

A. Field trips to area corn plots.
B. Field trip to corn drying and storage systems.
C. Bulletin board display.
D. Films, slides and filmstrips on corn production.
E. Field trips to successful corn growers.
F. Attend field days and farm progress days.
G. Field trip to research farm.
H. Field trip to area corn harvesting equipment dealer.
I. Field trip to farmer with high moisture corn set-up.

V. Learning Activities

A. Occupational experience programs.
B. Design a corn program for the home farm.
C. Collect samples of various types of corn.
D. Run moisture tests on corn.
E. Perform a yield check on corn.
F. Participate in a local department corn yield contest.
G. Plots utilizing different row spacing and plant populations.

VI. Materials Needed

A. Books
  1. Aldrich. *Modern Corn Production.* A & L Publications. 1965.
  2. Brickbauer. *Approved Practices in Crop Production. Interstate.* 1967.
  3. Brickbauer. Berge, Fisher, Nelson, Vilstrup, Weigle, Worf. *Grain Marketing in Wisconsin.* College of Agricultural and Life Sciences, University of Wisconsin - Madison.
  4. Delorit & Ahlgren. Greub. *Crop Production.* Prentice-Hall. 1974

B. Bulletins and Pamphlets
  1. "Corn." Circular 548, University of Wisconsin-Extension.
  2. "Corn Culture." Circular 549, University of Wisconsin-Extension.
  3. "Corn Diseases in the U.S. and their Control." AAH99, UW-Ext. March, 1978.
  4. "Shelled Corn Drying in Wisconsin. UW-Extension, March, 1972. A2379.
  5. "Corn Silage for Wisconsin Cattle." A1178, University of Wisconsin-Extension.
  6. "Diseases of Corn in the Midwest." Publication 21, North Central Regional Extension.
  7. "Drying Shelled Corn and Small Grains." FB2214, U.S.D.A.
  8. "The European Corn Borer." FB-2190, U.S.D.A.
  9. "Southern Corn Leaf Blight in Wisconsin." Circular 674, University of Wisconsin-Extension.
  10. "Wisconsin Agricultural Statistics," Wisconsin Dept. of Agriculture, Trade and Consumer Protection, 1979.
  11. "Moldy Corn Poisoning, A2184, U.W.-Extension, A2184.
  12. "Wisconsin Corn Hybrids." Circular 675, University of Wisconsin-Extension.

C. Films and Filmstrips
  1. The following films from BAVI-University of Wisconsin:
    a. "Corn." 2722
    b. "Corn Farmer." 5854
    c. "Corn From Bag to Bin." 5818
    d. "Modern Row Crop Planter." 6989
    e. "Seeds of Plenty." 7696

DAIRY CATTLE MANAGEMENT

I. Performance Objective

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in dairy cattle management and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Discuss the various dairy breeds and their characteristics.
- C. Evaluate and select breeding stock.
- D. List and discuss the labor, feed, and housing requirements of the dairy enterprise.
- E. Develop an understanding of dairy cattle breeding systems, genetics, sire selection and evaluation.
- F. Formulate herd health programs for the prevention of dairy cattle diseases.
- G. Discuss the various diseases of dairy cattle.
- H. List the steps and procedures for producing high quality milk.
- I. Understand the methods used in improving herd production type analysis.
- J. List and discuss how dairy products are produced.
- K. Compare milk grades, marketing orders, and price blends.
- L. Describe a good program for raising dairy calves that is practical, economical and feasible for the growth and development of good herd replacement.
- M. Evaluate goals of dairymen in improving breeding efficiency.
- N. Comprehend the reproductive system of farm animals.
- O. Discuss the advantages of dairy herd testing.
- P. Compare the methods used to determine the butterfat content of milk.

II. Concepts to Develop

- A. There are career opportunities in the dairy industry for young men and women at all levels of educational preparation.
- B. Artificial insemination has had a significant impact on the type and production of dairy cattle in recent years.
- C. Correct evaluation of the dairy cow's characteristics is essential before selecting a sire for mating.
- D. All dairy cows should be fed for production.
- E. Successful dairymen raise most of their herd replacement.
- F. A positive relationship exists between quality of dairy products and their rate of consumption.
- G. An effective culling program is dependent on the availability and correct interpretation of the records of each cow.
- H. Knowledge of desirable characteristics is essential when selecting replacements for the home dairy herd.
- I. Several methods of marketing milk and other dairy products are available.
- J. Hormones play a vital role in milk secretion and "letdown."
- K. The lack of proper disease and insect control measures result in lower production levels.

III. Subject Matter to Teach

- A. Careers
  - 1. Current and future employment needs.
  - 2. Job description.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relating to student needs and aspirations.
- B. Breeds of dairy cattle
  - 1. The Holstein.
  - 2. The Guernsey.
  - 3. The Jersey.
  - 4. The Brown Swiss.
  - 5. The Ayrshire
  - 6. Resea[illegible]lopment of new bree[illegible]
- C. Selection and breeding of dairy cattle
  - 1. Selction of foundation stock.
  - 2. Evaluation and selection of sires.
  - 3. Breeding dairy cattle.
- D. Dairy cattle judging and evaluating type
  - 1. Requires a knowledge and interest in dairy cattle.
  - 2. Breed associations identify qualifications and disqualifications in registering purebred cattle.
  - 3. Parts on a dairy cow classification score card.
  - 4. Identifying dairy terms for general appearance, dairy character, body capacity, and mammary system.
  - 5. Establishment of type standards.
  - 6. Correlation between type and production.
  - 7. Methods of evaluating type.
    - a. Breed classification programs.

    - b. Competing in the show ring.
    - c. Learning type appraisal.
  - 8. Dairy judging contest.

E. Feeding dairy cattle
  - 1. The feeds for dairy cattle.
  - 2. The nutritive content of common dairy cattle feeds.
  - 3. The digestive system of dairy cattle.
  - 4. Nutritive requirements.
  - 5. Dairy rations for different breeds and age groups.
  - 6. The use of forage, silage, and pasture.
  - 7. The use of protein supplements.
  - 8. Formulating rations (Pearson Square).

F. Raising replacement dairy stock
  - 1. Care of the dry cow.
  - 2. Important early feeding of calf.
  - 3. Feeding following the colostrum period.
  - 4. Feeding schedules.
  - 5. Dry feeding requirements.
  - 6. Loss of calves.
  - 7. Calf management practices.
  - 8. Heifer feeding program.

G. Reproduction in dairy cattle
  - 1. Reproductive physiology of the female.
    - a. Anatomy of the reproductive tract.
    - b. The estrus cycle.
  - 2. Reproductive physiology of the male.
    - a. Anatomy of the reproductive tract.
    - b. Semen production.
  - 3. Abnormalities of reproduction causing decreased fertility or sterility.
    - a. Structural defects.
    - b. Physiological abnormalities.
  - 4. Diseases affecting reproduction
    - a. Brucellosis.
    - b. Vibriosis.
    - c. Trichomoniasis.
    - d. Leptospirosis.
    - e. Non-specific infections.
  - 5. Nutrition and reproduction.
  - 6. Inheritance of fertility.
  - 7. Managing dairy cattle for high fertility.
  - 8. Optimum age for beginning reproduction.
    - a. Detecting heat in cattle.
    - b. The period of gestation.
    - c. Adequate care at calving.
    - d. Feeding at calving time.
    - e. Milking at calving.
    - f. Udder edema.
  - 9. Management of reproduction in male.
    - a. Effect of feed on reproductive performance.
    - b. Rate of usage.
    - c. Housing for bulls.
  - 10. Summary of procedures for improving breeding efficiency.

H. Artificial insemination — sire selection
  - 1. Past history of artificial insemination.
  - 2. Collecting and processing semen.
    - a. Frequency of collection.
    - b. Evaluation of semen.
    - c. Semen diluters.
  - 3. Frozen semen.
  - 4. Inseminating the cow.
  - 5. Artificial breeding organizations.
  - 6. Records in artificial insemination.
  - 7. Inbreeding and outbreeding.
  - 8. Advantages of artificial breeding.
  - 9. Principals of selecting.

I. Milk secretion — proper milking procedures.
  - 1. Composition of milk.
  - 2. Structure of udder.
  - 3. Circulatory system of udder.
  - 4. Milk "letdown" mechanism (hormones).
  - 5. Rapid milking rate.
  - 6. Adjusting individual milking machines.
  - 7. Milking procedure.
  - 8. Factors affecting milk output.
  - 9. Producing high quality milk.

J. Milk testing
  - 1. Babock method.
    - a. Procedure.
    - b. Use of test.
  - 2. Schain test.
  - 3. DPS test.
  - 4. Milk o-Tester.
  - 5. Solids—non fat.

K. The use of dairy management records.
  - 1. The Dairy Herd Improvement Association (D.H.I.A.)
    - a. Owner-Sampler records
    - b. use and interpretation of standard D.H.I. records.
    - c. Test Interval Method (TIM).
  - 2. The cost of record keeping and choosing a record system.
  - 3. Milk production and butterfat
  - 4. Herd health records.

L. Disease and parasites of dairy cattle.
  - 1. Diseases and ailments of dairy cattle.
  - 2. Poisonous chemicals and plants.
  - 3. Disease prevention and treatment.

4. Parasites of dairy cattle—external and internal.
5. Normal temperature and breathing rate.
6. Equipment needed for treatment.

M. Dairy cattle housing
  1. Housing requirement regulations.
  2. Selection of type and size of dairy housing.
  3. Selection of proper silo and arrangement of dairy buildings and equipment.
  4. Health and comfort of animals.
  5. Milking facilities.
  6. Milk house.
  7. Storage of feed and bedding.

N. Marketing dairy cattle, milk and dairy products
  1. Marketing grade and purebred dairy cattle.
    a. Replacement heifers.
    b. Springing heifers.
    c. Milking cows.
    d. Cull cows.
  2. Federal orders.
  3. Classes of fluid milk.
  4. Blend price.

IV. Motivation

A. Field trips to outstanding area herds.
B. Attend dairy shows.
C. Bulletin board displays.
D. Up-to-date instructional media on dairy production.
E. Field trips to agribusinesses associated with the dairy industry.
F. Field trips for selection of breeding stock.
G. Films, filmstrips and slides.

V. Learning Activities

A. Occupational experience on area farms.
B. Participate in judging activities.
C. Dehorn calves, treat animals for lice, clip cow's udder and flanks, dip calf's navel in iodine.
D. Fit animals for dairy shows.
E. Exhibit animals at dairy shows.
F. Perform methylene blue test.
G. Perform several mastitis tests.
H. Perform several tests to determine butterfat content.

VI. Materials Needed

A. Books.
  1. Beeson. *Livestock Judging and Evaluation*. Interstate. 1978.
  2. Bundy & Diggins. *Dairy Production*. Prentice-Hall.
  3. Bundy & Diggins. *Livestock and Poultry Production*. Prentice-Hall. 1975 (4th ed.)
  4. Cole. *Introduction to Livestock Production*. W. H. Freeman and Co., 1962.
  5. Coletti. *Handbook for Dairymen*. Iowa State University, 1966, Rev.
  6. Davis. *Modern Dairy Cattle Management*. Prentice-Hall. 1962
  7. Ensminger. *Dairy Cattle Science*. Interstate. 1971 (1st ed.)
  8. Lampert. *Modern Dairy Products*. 1975.
  9. Moore. *Developing Profitable Dairy Herd*. Windsor Press.
  10. Morrison. *Feeds and Feeding*. Abridged. Interstate. 1961.
  11. Mortenson & Jurgenson. *Approved Practices in Dairying*. Interstate. 1977.
  12. Schmidt & VanVleck. *Principles of Dairy Science*. W.H. Freeman and Co., 1974
  13. Porter. *Dairy Cattle in American Agriculture*. Iowa State University. 1965
  14. Reaves. *Dairy Cattle Feeding and Managment*. 1979.
  15. Salisbury, Van Demark & Lodge. *Physiology of Reproduction & Art. Insem. of Cattle*. W.H. Freeman and Co.
  16. Foley. *Dairy Cattle*. 1972

B. Bulletin and pamphlets
  1. "Animal Nutrition Handbook." Ralston Purina Company, St. Louis, Missouri.
  2. "Dairy Cattle Sterility." Hafs and Boyd, Hoard's Dairyman.
  3. "Dairy Herd Improvement Progress Report." University of Wisconsin-Extension. (A2367).
  4. "Disposition of Calves in Wisconsin." Wisconsin Statistical Reporting Service, Madison.
  5. "Guidelines for Analyzing the Dairy Farm Business." University of Wisconsin Extension.
  6. "Planning for Dairy Farm Expansion." University of Wisconsin Extension.
  7. "Prevent Adulteration of Milk." University of Wisconsin Extension.
  8. "Sampling Milk for D.H.I. Tests, "University of Wisconsin Extension.
  9. Sire Directories from all A.I. organizations.
  10. "Using the DHI Grain Feeding Guide." University of Wisconsin Extension.

11. "Weighing and Sampling Devices for Pipeline Milking Systems." University of Wisconsin Extension. (A2155)
12. "What You Can Do About Bovine Mastitis." U.S. Dept. of Agriculture, Washington, D.C. (FB2253A).
13. "Wisconsin Farm Enterprise Budgets—Dairy Cows and Replacements." University of Wisconsin Extension.
14. "Wisconsin U.S.D.A. Sire Report." University of Wisconsin Extension. A2235.

C. Films and Filmstrips

1. "Barns for Better Dairying," United States Steel, Chicago Film Distribution Center, 208 South LaSalle Street, Chicago, Illinois.
2. "Breakthrough on Calf Scours Control." John Deere Film Library.
3. "The Cow's Udder and How It Functions." Vocational Agriculture Service, Urbana, Illinois.
4. "Fitting and Showing FFA Dairy." California State Polytechnic College, San Luis Obispo, California.
5. "From cow to Carton." Modern Talking Picture Service, 1969 N. Aster Street, Milwaukee, Wisconsin.
6. "Garget." Babson Brothers Dairy Research Service, 2100 South York Road, Oak Brook, Illinois.
7. "Grow Your Own Dairy." Venard Films, Peoria, Illinois.
8. "The Loose Housing of Dairy Cattle." United States Steel.
9. "Mastitis is Your Problem." Babson Brothers, 2100 South York Road, Oak Brook, Illinois.
10. "Pre-natal Development of the Calf." California State Polytechnic College, San Luis Obispo, California 93401.
11. "Pointers for Judging Registered Holsteins." Holstein-Fresian Association, Battleboro, Vermont. (Slide series).
12. "Raising Dairy Calves." Colonial Films, Atlanta, Georgia.
13. "Rumen Story." Ralston Purina Company.
14. "Science of Profitable Dairying." Ralston Purina Company.
15. "Sterility . . . A Multimillion Dollar Loss to Dairymen." Tri-State Breeders Co-op, Westby, Wisconsin.
16. "The Story of Vacuum." Babson Brothers.
17. "The Surge Sanitation Story." Babson Brothers.
18. "The Veterinarian Looks At Functional Type." Holstein-Friesian Association, Tri-State Breeders, Dept. of Public Relations, Westby, Wisconsin.
19. "The Day Milk Was Turned Off." Association Sterling, 512 Burlinton Ave., LaGrange, Illinois.
20. "Making Your Cows Worth More." Babson Brothers.

D. Laboratory manuals

1. *Adult Farmer Course List.* (revised 9-1-73), Adult Agricultural Program on Animal Husbandry, Area Vocational , Technical and Adult Education District No. 4, Daniel W. Scheid, Chairman, Agriculture Division.
2. American Breeders Service, Inc. *AI Management Manual.* DeForest, Wisconsin, 1971.
3. *Dairy Herd Improvement Handbook*, published by Wisconsin Junior Dairymen's Association, Chilton High School, Chilton, Wisconsin.
4. *Dairy Production Guide.* Land O'Lakes Felco Division, Fort Dodge, Iowa, 3rd edition.
5. *Judging Registered Holsteins.* Holstein-Friesian Association of America, Brattleboro, Vermont.
6. *The Way Cows Will be Milked on Your Dairy Tomorrow.* 7th edition. Babson Brothers Dairy Research Service, 2100 South York Road, Oak Brook, Illinois (1970).

E. Periodicals

1. *Brown Swiss Bulletin*
2. *Dairy Express*
3. *Dairyman's Digest*
4. *Hoard's Dairyman*
5. *Holstein-Friesian World*
6. *Land O'Lakes Mirror*
7. *Milking Shorthorn Journal*
8. *Wisconsin Dairy Facts*
9. *Wisconsin Guernsey's*
10. *Wisconsin Holstein News*

DAIRY HERD TESTING

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in dairy science and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Be familiar with the reasons for testing the dairy herd.
- C. Understand methods of keeping dairy production records.
- D. Understand how records are computed for uniform and equitable production comparisons.
- E. List and discuss ways in which milk tests vary.
- F. Prepare and use dairy production records.
- G. Analyze yearly herd records.
- H. List and discuss ways records aid in types of management decisions.

II. Concepts to Develop

- A. There are career opportunities in dairy herd testing and production for young men and women at all levels of educational preparation.
- B. Records are tools for herd improvement.
- C. Testing procedures are exacting and need to be followed with precision.
- D. Records make it possible to compare individual animals and entire herds.
- E. Yearly analysis of herd records is a good management practice.

III. Subject Matter to Teach

- A. Careers
  - 1. Current and future employment needs.
  - 2. Job description.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relating to student needs and aspiration.
- B. Why test the dairy herd?
  - 1. Tools for herd improvement.
  - 2. Economic importance of a testing program.
- C. Mechanics of keeping dairy production records
  - 1. Methods of testing.
  - 2. Procedures for collecting milk samples.
  - 3. Identification of dairy animals.
  - 4. Record keeping plans.
- D. How records are computed
  - 1. General instruction.
  - 2. Forms used in hand-computed records.
  - 3. Forms used in other record plans.
- E. Why milk tests vary
- F. How to use production records throughout the year
  - 1. Am I feeding enough?
  - 2. Which cows should be bred and when to breed?
  - 3. Sire selection and mating to individual cows.
  - 4. Which cows should be dried off?
  - 5. Which cows freshened since last test?
  - 6. Which cows should be culled?
  - 7. What provisions are being made for herd replacements?
  - 8. How can Rolling Herd Average be used to improve the herd?
- G. Yearly herd analysis
  - 1. Evaluating herd performance.
  - 2. Measuring the performance of an individual cow.
  - 3. Measuring the performance of the herd.
  - 4. Cow evaluation.
  - 5. Sire evaluation.
- H. Managment decisions to consider
  - 1. Improved feeding practices.
  - 2. Improved breeding practices.
  - 3. Herd health.
  - 4. Milking methods.
  - 5. Insect control.
  - 6. Milk quality.
  - 7. Milk marketing.
  - 8. Dairy promotion activities.

IV. Motivation

- A. Field trip to DHI laboratory.
- B. DHI supervisor to speak to students on related topics.
- C. Construct testing boxes and cow identification signs.
- D. Participate in WJDA program of activities.
- E. Show slide series on ARC-DHI testing programs.
- F. Keep bulletin board on milk testing activities.
- G. Have regular meetings of all interested students of local WJDA
- H. Use outstanding farmers or personnel in the dairy industry to speak on dairying as a dynamic industry.

V. **Learning Activities**

A. Occupational experience program in dairying.
B. Demonstrate correct procedure for milk weighing and sampling.
C. Demonstrate correct procedure for testing milk for butterfat.
D. Work out sample records for individual cows and entire herd on monthly and yearly basis.
E. Check butterfat from different cows and herds to show variations in BF content.
F. Demonstrate simple tests for mastitis.

VI. **Materials Needed**

A. Books
  1. Bundy & Diggins. *Dairy Production*. Prentice Hall. 1978 (4th ed.)
  2. Ensminger. *Dairy Cattle Science*. Interstate. 1979. (2nd ed.)
  3. Juergenson. *Approved practices in Feeds & Feeding*. Interstate. (1977)
  4. Morrison. *Feeds & Feeding*. Interstate. 1961.
  5. WJDA. *Dairy Herd Improvement Handbook*. (Revised 1973)
B. Bulletins and pamphlets
  1. "Dairy Herd Improvement Progress Report," U.W. Extension Report.
  2. "Did You Know Every Cow is Different?" Dairy Science Dept. U.W.-Madison.
  3. "Make Dairying Pay the Record Way," U.W. Extension Reports U.W.-Madison.
  4. "25 to 1 In Your Favor — The Record Way," DHI. Madison, Wisconsin.
  5. "Wisconsin Dairy Facts," WI. Statistical Reporting Services.
C. Films, filmstrips and slide sets
  1. "Dairy Farmer" — BAVI.
  2. "Dairy herd Improvement" — BAVI.
  3. "Feeding for Milking Profits" — Ralston Purina Company.
  4. "Good Milking Pays" — BAVI.
D. Workbooks
  1. Pynnonen, A. *Vocational Agriculture — Wkbk. No. 1.* Sheldon Book Co., Sheldon, Wisconsin.
E. Periodicals
  1. Monthly *DHI Newsletter*.
F. Laboratory Supplies
  1. NASCO, Fort Atkinson, Wisconsin.
  2. Local Dairy Supply Companies.

DAIRY PRODUCT MANUFACTURING

I. **Performance Objectives**

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in dairy product manufacturing and will be able to relate these factors to his/her own specific needs and aspirations.
B. Locate the major dairy producing and manufacturing areas of Wisconsin and the United States.
C. Identify the leading counties, states and nations in the production of milk and dairy products.
D. Discuss, orally or in writing, the importance of dairying to his/her area.
E. Explain, orally or in writing, several factors affecting the composition of cow's milk.
F. List the major constituents of milk and discuss the significance of each constituent to the total composition of milk.
G. Discuss the percentages of the constituents of cow's milk.
H. Identify off-flavors in milk.
I. Describe variations in the color of milk and give reasons for this variation.
J. Perform laboratory tests to determine the physical properties of milk.
K. Compare the common dairy processes involved in the handling of fluid milk, the purpose of each process, and how it relates to the total handling of the milk.
L. Discuss, orally or in writing, the importance of dairy products to the national, state and local economy.
M. Group dairy products according to a standard classification form.
N. Explain the fundamentals involved in the manufacturing of dairy products.
O. Evaluate a sample of a manufactured dairy product using a standard scorecard.
P. Describe the several marketing methods associated with dairy products and the economic effects of supply and demand.
Q. Relate the long-term trend in the consumption of each product, the number of plants manufacturing that product, and the proportion of the milk supply being used for manufacturing.

R. Discuss some possible problems involved with the disposal of waste products.
S. List and discuss a minimum of ten occupations in the dairy manufacturing industry.
T. Explain the curriculum available at one of the technical institutes or universities offering a course in dairy-related occupations.

II. Concepts to Develop

A. There are career opportunities in the dairy product manufacturing industry for young men and women at all levels of educational preparation.
B. Breed differences influence the composition and nutritive value of milk.
C. Quality control is essential throughout the process of handling and manufacturing of dairy products.
D. Each manufactured dairy product is the result of a unique process.
E. Grading dairy products is an essential link in the marketing chain.
F. The dairy industry makes a significant contribution to the economy and to the nutritional needs of our people.
G. Many processes are involved in the handling and manufacturing of dairy products.
H. Progress has been made in solving waste disposal problems.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs.
    2. Job description.
    3. Training requirements.
    4. Working conditions.
    5. Opportunity for advancement.
    6. Other factors relating to student needs and aspirations.
B. Survey of the dairy industry
    1. Location of major dairy producing and manufacturing areas.
    2. Importance of dairying locally.
C. Physical properties of milk
    1. Off-flavors and color variations.
    2. Laboratory tests for determination of quality.
D. Composition and nutritive value of milk
    1. Major constituents of milk and their significance.
    2. Factors affecting the composition of milk.
    3. Percentage of each constituent in milk.
    4. Nutrient value to human needs and diet.
E. General dairy processes
    1. Common dairy processes involved in the handling of fluid milk.
    2. Principles involved in the operation of processing equipment, as well as its proper use, care and maintenance.
    3. Disposal of waste products.
F. Dairy product manufacturing (may apply to any one of the dairy products with changes)
    1. Importance of the product to the economy.
    2. Grading of the dairy product.
    3. Fundamentals involved in manufacturing.
    4. Manufacturing the product in the laboratory.
    5. Composition of the finished product.
    6. Evaluation of the quality of the finished product.
    7. Marketing and the effect of supply and demand.
    8. Long-term trends in consumption and manufacturing of the product.
G. Dairy Industry Education
    1. Post-high school education available.

IV. Motivation

A. Field trips to manufacturing plants.
B. Field trips to dairy-testing equipment—manufacturing plant and laboratories.
C. Guest speakers from related fields of the industry.
D. Slide sets, filmstrips, and films on dairy product manufacturing.
E. Pamphlets and displays.
F. Judging contest with possible participation in the state contest.
G. Field trip to a technical institute.

V. Learning Activities

A. Occupational experience program.
B. Make a graph or map of the milk and dairy producing area.
C. Chart a comparison of whole milk with manufactured dairy products.
D. Study reports of factors influencing the composition of milk.
E. Laboratory exercises, such as butterfat test, freezing point, viscosity, etc.
F. Judging contest for off-flavors.
G. Disassemble and assemble dairy equipment or mock-ups.
H. Produce a dairy product, such as cheese, in the laboratory. Have it graded when completed.

I. Prepare displays of cheese trays as a means of advertising the product.
J. Collect containers used in the dairy product manufacturing industry.
K. Appropriate tests to discover the students' interests and aptitudes.

VI. Materials Needed

A. Books
  1. Lampert, Modern Dairy products Chemical Publishing Co., New York, NY. 1975
  2. Course Outline for Milk Processing Plant Employee, Agricultural Education, Teaching Materials Center, Texas A & M University, College Station, Texas 77843
  3. Cheese Monograph Series-Volume I to V, Charles Pfizer & Company, 235 East 42nd Street, New York, New York 10017
  4. Eckles, Milk & Milk Products, McGraw-Hill 4th Edition
  5. Judkins, Keener, Milk Production and Processing. Wiley & Sons. 1960

B. Bulletin & pamphlets
  1. "A World of Wisconsin Cheese." Wisconsin Department of Agriculture, Trade and Consumer Protection, Madison, Wisconsin 53713
  2. From: Bulletin Mailing Room, College of Ag., Univ. of WI-Madison, Madison, WI 53706
    a) Handbook of Lactic Starters, Circular 383
    b) Standardizing Milk For Cheese Making, Circ. 408
    c) Making Cheddar Cheese From Pasteurized Milk, Circ. 464
  3. From: Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402
    a) Cheese Buying Guide for Consumers, Bulletin, 17-106
    b) Cheese Varieties-Ag. Handbook #54
    c) Judging & Scoring Milk Farmers, Bulletin #2111
  4. From: National Dairy Council 111 No. Canal Street Chicago IL 60606
    a) Dairy Council Digest
    b) How Americans Use Their Dairy Foods
    c) Newer Knowledge of Milk
  5. From: Wisconsin Agriculture Reporting Service, P.O. Box 3160, Madison, WI 53715
    a) Wisconsin Dairy Facts
    b) Wisconsin Agricultural Statistics
  6. Dairy Producer Highlights, Natl. Milk Producer's Federation, 30 F Street, N.W., Washington, D.C. 20001

C. Films and Filmstrips
  1. "Cheese and Cheesemaking," International Film Bureau, 332 South Michigan Avenue, Chicago, IL 60604 or
     Visual Aids Service, University Extension Division, University of Wisconsin, Madison, Wisconsin 53706
  2. "Marketing Grade A Milk", Cooperative Extension Service, University of Wisconsin, Madison, Wisconsin 53706
  3. "This Is The Dairy Industry", Modern Talking Picture Service Regional office. Elmhurst, Illinois

D. Laboratory Manuals
  1. Manual for Milk Plant Operations, Milk Industry Foundation, 910-17th Street, N.W. Washington, D.C.

E. Periodicals
  1. Dairymen Digest
  2. Dairy Managment
  3. Doane's Agricultural Report
  4. Farmer's Digest
  5. Hoard's Dairyman
  6. Successful Farming
  7. The Dairy Plant Fieldman
  8. Wisconsin Agriculturist

ELECTRICITY, AGRICULTURAL POWER

I. Performance Objectives

Upon competion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the agricultural power industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Employ electrical principles and terminology in the laboratory exercises.
C. Apply fundamental skills, procedures and circuitry involved in electrical wiring.
D. Be familiar with electrical safety and electrical codes.

E. Apply electrical maintenance and simple electrical wiring operations.
F. Be familiar with electric motors, controls and applications.
G. Be able to safely disconnect power before working on electrical circuits.

II. Concepts to Develop

A. There are career opportunities in agricultural power for young men and women at all levels of educational preparation.
B. Electricity is hazardous if safety procedures are ignored.
C. The electrical industry is varied and diverse in scope.
D. Electrical principles are followed by workers in this industry.
E. Electrical systems need to be maintained.
F. Guidelines have been developed for motor selection, maintenance and application.
G. Electrical codes are standards for proper procedures.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
B. Significance of electrical power in our lives.
  1. Magnitude of electrical energy produced
  2. Impact of electrical energy on our lives
  3. Conservation of electricity
  4. Electric usage calculations
C. Principals of Electricity
  1. Conventional theory
  2. Electron theory
  3. Circuits
D. Electrical Terminology
  1. Electrical terms
  2. Ohms Law
  3. Energy measurement
E. Electrical Safety
  1. U.L. label
  2. Cords
  3. Proper fuses, breakers, weatherproofing devices
  4. Service safety
  5. Grounding procedures
  6. Ground Fault Circuit Interceptor (GFCI)
F. Generation, Transmission and Sale of Electrical Power
  1. Area generating plants
  2. Types of generating plants
  3. Transformers and transmission lines
  4. Substations and distribution
G. Farmstead Electrical Distribution
  1. Distribution lines and pole location
  2. Farm transformers
  3. Service drops
H. Planning Building Circuitry
  1. Demand
  2. Code requirements
  3. Design
I. Conductors
  1. Wire sizes
  2. Wire capacities
  3. Insulation types
J. Boxes, Switches, Receptacles, Fixtures, Appliance Identification
  1. Types of boxes
  2. Switch identification and hook-up
  3. Receptacle types
  4. Fixture identification and installation
K. Electrical Installation Tools and Test Equipment
  1. Tool identification and installation
  2. Test lights and meters
L. Wiring Installation Procedures
  1. Non-metallic cable
  2. Armoured cable-wires
  3. Conduit-wires
  4. Sheathed cable
  5. Cutting, splicing connecting wires
M. Lighting Systems
  1. Equipment operation
  2. Layout and selection
N. Electrical Maintenance
  1. Cords, plugs, and connectors
  2. Switches, receptacles, and fixtures
O. Electric motors
  1. Principals of operation
  2. Motor types
  3. Motor maintenance
  4. Fractional horse power motors
  5. Large electric motors
P. Motor Applications
  1. Selection
  2. Protection
  3. Drives
  4. Motor maintenance
Q. Automatic Controls
  1. Switches and switch control circuits
  2. Relay devices
  3. Motor control devices
  4. Automatic sensing devices

R. Three Phase Power
  1. Biggest obstacle - getting service to your farm
  2. Advantages of three phase power
  3. Use of phase converters
    a. Static converter
    b. Rotary transformer

S. Farm Applications of Electricity
  1. Irrigation systems
  2. Grain drying
  3. Heat lamps
  4. Heat cable
  5. Water heating
  6. Electric fences
  7. Ventilation
  8. Humidifiers
  9. Dehumidifiers

T. Emergency Generation of Power
  1. Tractor PTO driven units
    a. Alternators
    b. Generators
  2. Self contained engine driven units (gasoline or diesel)
    a. Electric current only
    b. Combination generator-welder units

VI. Materials Needed

A. Books
  1. Agricultural Wiring Handbook-1978-Food & Energy Council, Inc., 909 University Avenue - Columbia, MO. - 65201
  2. Electrical Lesson Plans - Erpelding - Interstate
  3. Electrical Lesson Plans - Instructors Manual - Erpelding - Interstate
  4. Fundamentals of Electricity - Seippel - 6th Edition - American Technical Society - Chicago, Illinois
  5. House Wiring Simplified - Mix - Goodheart-Willcox
  6. Practical Electrical Wiring - 11th Edition - Residential, Farm, and Industrial - Richter & Schwan - McGraw-Hill
  7. Practical Handbook of Electrical Repairs - Day - National Farm Book 1969
  8. Using Electricity - Hamilton - National Farm Book - 1971

B. Booklets & Pamphlets

The following are available from AAVIM - Athens, Georgia
  1. Electrical Energy
  2. Electrical Wiring - Teachers Guide & Student Workbook
  3. Electric Motors - Selection, Protection, Drives
  4. How Electric Motors Start & Run
  5. Understanding Electricity & Electrical Terms

The following are available from Hobar Publishing Co. - St. Paul, Minn.
  1. Basic Electricity & Practical Wiring
  2. Electrical & Basic Controls Used in Agriculture Production
  3. Farm Electricity
  4. Farm Equipment Electrical Systems

The following are available from Pennsylvania State University - Agricultural Education Dept., University Park, Penn. 16802
  1. Basic Electricity & Practical Wiring Lessons - Student Handbook & Teachers Manual

The following are available from Vo-Ag Service, College of Agriculture, 434 Mumford Hall, Urbana, Illinois, 61801
  1. Electrical Hazards in Home, Farm & Business
  2. Electrical Wiring Procedures
  3. Planning for Electrical Wiring
  4. Using Three-Phase Electrical Power on the Farm

The following are available from Vocational Instructional Services - Texas A. & M. University - College Station, Texas - 77843
  1. Farm Electrification Lesson Plans
    (a) Wiring & Safety
    (b) Controls & Control Circuits
  2. Electric Motors - Lesson Plans for Agricultural Production

C. Slides & Slide Films

The following slide sets are available from AAVIM, Athens, Georgia
  1. Maintaining the Lighting and Wiring Systems
  2. Understanding Electricity & Electrical Terms

The following slide films are available from Vo-Ag-Service - College of Agriculture, University of Illinois, 434 Mumford Hall - Urbana, Ill.

1.	Clean Electric Motors	
2.	Electric Motors 1	- Magnetism & DC Motor
3.	Electric Motors 2	- Induction & AC Motor
4.	Electric Motors 3	- Test, Connect, Reverse
5.	Electric Motors 4	- Trouble Shooting
6.	Identification of Electric Wiring Systems	

ENERGY, ALTERNATIVES

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment opportunities in the areas of alternate energy research, design, development, promotion, production, installation, sales, and service.

B. Identify the training required and available opportunities for advancement; and the physical and mental requirements for employment in agricultural energy fields.

C. Describe at least four alternate sources of energy which could be useful to agriculture.

D. Identify which alternate source of energy provides the most economical solution to his energy needs.

E. Examine each new energy source for its potential safety and environmental hazards.

F. Construct a solar collector when given the proper materials.

G. Calculate the proper collector angle for maximum exposure during peak energy need periods.

H. Size of the storage area for a given solar system.

I. Compare active and passive solar heating systems.

J. Identify possible uses of wind energy for agriculture.

K. List the problems facing the development of wind energy.

L. Discuss the history of wind power.

M. Evaluate the efficient use of the wind by a windmill.

N. Discuss how fuels can be generated from plant sources.

O. Understand the steps in producing fuels from waste.

P. Compare the usefulness of manure for energy production and for maintenance of soil tilth and fertility.

Q. Identify the major energy consuming jobs on a dairy farm.

R. Evaluate the cost of a heat exchanger in terms of energy saved.

II. Concepts to Develop

A. There are career opportunities for young men and women in the alternative energy fields at all levels of educational preparation.

B. American agriculture must look to new sources of energy to supplement fossil fuel usage.

C. With present technology, no new source of energy can completely replace agriculture's dependance on fossil fuels.

D. Solar energy is better suited for certain areas than others.

E. Most of the alternate sources of energy have been in limited use for a long time.

F. As more work is done with the new energy sources, some answers to the present problems will be found.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

B. Solar Energy
   1. Solar collectors.
      a. Flat-plate type collector.
      b. Concentrating type collector.
   2. Types of air flat-plate collectors.
      a. An air collector; metal roof painted a dull black with air blown underneath.
      b. Cover-plate collector; cover plate of glass, plastic or fiberglass with air circulated between the cover and the absorber plate.
      c. Covered, suspended plate; has air circulated both above and below the absorber plate.
   3. Types of water collectors.
      a. Basic water collector; consists of an absorber plate, generally having water tubes attached. A cover, and insulation behind the absorber plate.
      b. Another type has no water tubes. The water simply flows down over the absorber in a sheet or open channel.
      c. Freezing during periods of non-use is a problem when using water type collectors.
         1) The collector must be drained when not in use.
         2) Use an antifreeze solution.
   4. Solar air heaters are the most common for livestock housing.

5. Collector efficiency.
  a. Defined as; "The ratio of the amount of useful heat collected to the total amount of solar radiation striking the collector surface during any period of time."
  b. Typical efficiencies for heating collectors;

Type	*Efficiency*
Plastic tube type	25%
Bare-plate	30%
Covered-plate	35%
Covered, suspended plate	40%
2-Cover, suspended plate	45%

6. Composition of a solar collector.
  a. Cover material
    1) Glass
    2) Plastic films or sheets
    3) Greenhouse grade fiberglass
  b. Absorber plates
    1) Black will absorb more radiant energy than any other color (flat better than gloss).
    2) Collector plates are generally copper, aluminum or steel.
    3) For air collectors wood and plastic have been used.
  c. Casing construction.
    1) The casing may be wood, sheet-metal or fiber reinforced plastic.
    2) The cover must be fastened to allow for expansion and contraction.

7. How much solar energy is available?
  a. Availability is affected by atmospheric conditions, the seasons of the year, the time of the day, and the latitude.
  b. Mean average total hours of sunshine in Wisconsin is about 2400 hours/year.

8. Solar energy storage.
  a. Sensible heat storage
    1) Tanks of water
    2) Beds of rock
  b. Heat of fusion storage

9. Designing a solar heating system.
  a. Heating load.
  b. Insulation levels.
  c. Heat storage requirements.

10. Solar grain drying

C. Wind Power
1. History of wind power
  a. First used in Persia in the 7th century.
  b. In 1920 wind power was the major source of power on farms and homesteads.
  c. Rural Electrical Administration (REA) made wind power for electricity a thing of the past.
2. Wind power resources
  a. About 2% of all solar energy that falls on the earth is converted to wind.
  b. Estimated annual wind energy output could be enough to meet 5 to 10% of our total energy needs by the year 2000.
3. Technology of wind power.
  a. Converts kinetic energy to mechanical energy.
  b. The conversion is about 35% efficient.
  c. Power output depends on wind velocity and on the diameter of the blades.
  d. Greatest wind speed and constancy are at higher altitudes.
4. Deterents to wind power.
  a. Variable nature of the wind.
  b. Wind generator can only produce 25% of the total energy produced by a conventional plant of the same generating capacity.
  c. The variability of the wind also changes the frequency of the generated current.
  d. Storage of generated power is also a problem.
    1) Lead-acid batteries.
    2) Pumped water or air
    3) Electrolyze water
5. Storage may be avoided if enough windmills are connected.
6. Small wind generators are currently on the market.
7. Environmental problems.
  a. Land use - large space requirements.
  b. Aesthetic drawbacks.
  c. Economic drawbacks.

D. Fuels from Plants
1. Stored chemical energy, created in vegetation by photosynthesis, as a supplemental fuel for the future.
  a. Has a remarkably uniform energy content - about ½ that of coal.

    b. An "energy farm" the size of Texas could supply the 1985 energy of the U.S.
    c. Energy is released when plants decay or burn.
2. Resources
    a. Wood - at one time accounted for 90% of the U.S. energy supply.
    b. Grains for conversion to ethyl alcohol.
3. Technology
    a. One problem in using plants for energy is that photosynthesis is a relatively inefficient process.
    b. Increased production has come at the cost of increased dependence on petroleum.
    c. Need exists to develop hybrids which will make more efficient use of the sun.
4. Energy farms in practice.
    a. Harvesting algae
    b. Growing water hyacinths on sewage to produce methane.
    c. Using trees for fuel.
    d. Converting agricultural crops to alcohol.
5. Drawbacks
    a. Competition for land.
    b. Low photosynthetic efficiency.

E. Fuels from waste (Bioconversion).
1. Waste can be divided into organic and inorganic
2. Agriculture produces over 700 million tons of organic waste per year.
3. Most agricultural and lumbering wastes are combustible or fermentable.
4. Organic wastes are of most interest from an energy standpoint.
5. Organic waste is once living material; its molecules contain energy that can be released.
6. Sources of agricultural organic waste that could be easily collected.
    a. Manure - 26 million tons per year.
    b. Logging and wood mfg. - 5 million tons.
    c. Agriculture crops and food wastes - 12.3 million tons.
7. Waste has a negative connotation.
    a. Agriculture wastes have some positive value.
    b. Some have commercial value.
    c. Most produce benefits when returned to the soil.
    d. If we choose to convert them to energy there will be some replacement costs to consider (fertilizers, etc.).
8. Two general approaches by which we can convert waste to energy.
    a. Thermal systems - burning or converting to a fuel by some heat demanding process.
        1) Waste is shredded and burned with a fuel, usually coal.
        2) Waste is heated in the absence of air to produce several products which can be used as fuels.
    6. Biological systems - bacterial digestion of organic materials.
        1) Anaerobic digestion (absence of o_2) of animal manure produces methane gas.
        2) It is also feasible to produce sugar from the cellulose of plants and then ferment the sugar to alcohol.
9. Waste to fuel may produce a fuel which is economically competitive, but most of them need credit for solid waste disposal to be economically viable.
10. If we consider large scale conversion of agricultural and crop wastes, some balance will need to be struck between energy and the needs of the soil.
11. Manure may return more value if put back into the soil to replace fertilizer and maintain soil texture.

F. Heat Exchangers
1. The two largest uses of electrical energy on the average dairy farm are for cooling milk and for heating water.
    a. Together they may use 40 to 50% of the electric energy.
    b. Heat generated by cooling milk is often used to heat the milkhouse in winter.
2. Several manufacturers are now marketing heat exchangers which offer two advantages:
    a. They heat water by extracting heat from the hot refrigerant leaving the milk cooler compressor.

        b. Provide more efficient compressor operation by cooling the refrigerant.
    3. An additional hot water storage tank is needed.
    4. The installed cost is $500 to $1,500 above a conventional set-up.
    5. Data indicate it is an excellent investment on dairy farms with a pipeline system.
    6. The heat exchanger should provide at least 75% of the energy for heating water.
    7. Heat exchangers are capable of heating one gallon of water to 140 degrees Fahrenheit/gallon of milk cooled.

IV. Motivation

- A. Bulletin board display
- B. Films, slides and filmstrips
- C. Field trip to energy conserving industry or business
- D. Have resource speakers make class presentations

V. Learning Activities

- A. Conduct an energy awareness program for elementary students similar to the Food for America program.
- B. Sponsor an energy conservation poster contest for elementary students
- C. Demonstrate the construction of a compost pile for home gardeners.
- D. Prepare an exhibit on the insulation of dairy barns.
- E. Practice minimum tillage on chapter plots.
- F. Recondition and put back into use windmills for pumping water for livestock.
- G. Construct a gasahol exhibit.
- H. Prepare and present radio and TV programs on the use and conservation of energy.
- I. Write an article on energy conservation and publish it in the local and school newspaper.
- J. Prepare and deliver an FFA speech on energy.
- K. Students conduct an "energy watch" on home fuel and electric bills and formulate a plan for their reduction.
- L. Demonstrate the proper procedure for weatherstripping and caulking doors and windows.

VI. Materials Needed

A. Books

Anderson, Bruce. *Solar Energy—Fundamentals in Building Design.* McGraw Hill, 1977

Clews, Henry. *Electric Power from the Wind.* Solar Wind, 1974.

Daniels, Farrington. *Direct Use of the Sun's Energy.* Ballantine Books, 1974.

Fleck, Paul A. *Solar Energy Handbook.* Time-Wise Publications, 1975.

Federal Energy Administration. *Buying Solar.* U.S. Government Printing Office, 1976.

Fisher, Rick, and Bill Yanda. *The Food and Heat Producing Solar Greenhouse.* John Muir Publications, 1976.

Hickoke, Floyd. *Handbook of Solar and Wind Energy.* Cahners Publishing Co. Inc., 1975.

McCullagh, James C. *The Solar Greenhouse Book.* Rodale Press, 1978.

Mother Earth News. *Handbook of Home-Made Power: How to Use Wind, Water, Wood, Methane, and Solar Energy.* Bantam Books, 1974.

Park, Jack. *Simplified Wind Power for Experimenters.* Helion, 1975.

Science and Public Policy Program. *Energy Alternatives: A Comparative Analysis of Organic Farms.* University of Oklahoma, 1975.

Skoda, L.F., and L.W. Masters. *Solar Energy System-Survey of Materials Performance.* National Technical Information Service: U.S. Department of Commerce, 1977.

B. Pamphlets

Brace Research Institute. *A Survey of Agricultural Driers.* Quebec, Canada: McDonald College of McGill University, 1975.

Brooks, L.A., and O.I. Berge. *Heating Water With a Milk Cooler Exchanger.* University of Wisconsin-Extension Bulletin No. A2993, 1979.

National Science Teachers Association. *Energy Sources Fact Sheets.* Washington D.C., 1976.

New Alchemy Institute. *Methane Digesters for Fuel Gas and Fertilizer.* Pescadero, CA.

New Mexico Energy Institute. *Selecting Water-Pumping Windmills.* New Mexico, 1978. (Free)

New Mexico Solar Energy Association. *How to Build a Solar Crop Drier.* New Mexico, 1976.

Purdue University Cooperative Extension Service. *Solar Heating for Home, Farm and Small Business.* West Lafayette, Indiana.

Singh, Ram Bus. *Bio-Gas Plant: Generating Methane from Organic Wastes.* Hendersonville, N.C.: Mothers Bookshelf, 1976. (Free)

Thompson, P. and M.G. Clary. *Solar Heating for Milking Parlors.* U.S. Department of Agriculture, Bulletin No. 2266, 1977.

University of Wisconsin Extension. *Heating Water with a Milk Cooler Exchanger.* Madison, WI, 1979.

Tips for Energy Savers. U.S. Department of Energy, Washington, D.C.

American Petroleum Institute. *Energy and Our Lands.* Washington, D.C. 20037.

American Forest Institute. *Green America.* Washington, D.C. 20036.

Wisconsin Power and Light Company. *Guide to Farm Energy Management,* Madison, WI 53701.

University of Illinois at Urbana-Champaign. *Living With The Energy Crisis.* Champaign, Illinois, 61820.

University of Wisconsin. *Energy Facts.* Extension Publications.

University of Wisconsin. *How to Figure Heat Loss and Fuel Costs.* Extension Publications.

University of Wisconsin. *Tips on Saving Energy in Agriculture.* Extension Publications.

C. Periodicals

Alternative Sources of Energy Magazine

Mother Earth News

Solar Age

Solar Utilization News

Windpower Digest

Wind Technology Journal

Agricultural Engineers Digest

D. Films, Filmstrips, and Slide Sets (source examples)

1. Films
    a. *Energy: New Sources.* Film No. 40174, AVC Media Library Audiovisual Center, The University of Iowa, Iowa City, Iowa.
    b. *Energy: The Dilemma.* Film No. 40172, AVC Media Library Audiovisual Center, the University of Iowa, Iowa City, Iowa.
2. Filmstrips
3. Slide Sets
    a. *Applications of Solar Energy.* Sunstone Corp., Sheboygan, WI.

ENERGY CONSERVATION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be able to list available forms of energy.
B. Trace the energy usage of a product produced on a farm to the consumer.
C. Define terms related to energy conservation.
D. Perform mathematical problems using energy equations.
E. List conservation areas in agriculture that need improvement.
F. Understand insulation and R values.
G. Select motors and small engines with energy conserving features in mind.
H. Run irrigation systems with energy conservation in mind.
I. Realize the importance of energy conservation to gain time in solving energy problems.

II. Concepts

A. The main concept to keep in mind is that energy conservation in agriculture is only a short term solution to give research a chance to develop alternative methods of energy in agriculture.
B. Energy conservation practices in agriculture will not only save energy but may save money in the long run.

III. Subject Matter to Teach

A. Introduction to Energy Conservation and related terms.
1. Define Energy Conservation - students get working definition of conservation based on the knowledge they already have.
2. List sources of energy agriculture has at its disposal.
3. Check the list of energy supplied to agriculture and determine which are fossil fuels and which are man-developed.
    Example: Gasoline - fossil
    Electricity - manmade
4. Make a list of usable energy related terms and set up a definition.
    Example: BTU - quantity of heat required to raise temperature of one pound of water 1° F (between 32° and 212° F).

5. Exercises (mathematics) - Use definitions of terms and conversion units to do related mathematic problems.
   Example: Determine how many kilowatt hours (Kwh) of electricity it takes to replace or equal one gallon of diesel fuel.

B. Conserving Energy in Agriculture (General)
   1. What steps must be taken to use energy wisely (conserve) and try to maintain our standard of living.
   2. Make a daily energy usage chart (each student) including in the home energy use, at school use, and on the farm use.
   3. Make a list of ways to conserve energy from the daily chart.
      Example 1: turn off lights when not in use
      Example 2: reduce driving
      Example 3: clean machinery and combine farm operations
   4. Use both lists from B and C to determine exactly how much energy we use each day is wasted.

C. Energy Conservation in the Farm Home and Farm Buildings.
   1. Make a checklist of where energy is used in the home - all rooms, what time of day, etc.
   2. Take one room and closely examine all of the energy usage and conservation practices that could be used.
      Example: Conservation in the kitchen
         a. Match pots and pans to burner size
         b. Avoid oven peeping
         c. Cover pans when possible
         d. Make sure pilot light on gas range is properly adjusted
         e. Use smaller appliances whenever possible (popcorn popper, waffle iron, skillets); they use less heat
         f. Continue list using data from resource books
   3. Examine insulation features offered by manufacturers for home use.
         a. Determine R factors of insulation
         b. Loss of heat around windows
         c. Attic or basement heat loss
         d. Room use of heat - circulation
   4. Examine the energy saving practices around the farm buildings.
      Example: Ceiling insulation
   5. Using windbreaks as an energy conservation practice.
   6. Selecting proper lighting systems and bulb use in both home and farm buildings

D. Energy Conservation in Production Agriculture.
   1. Tractor tune-up minimizes energy use.
      1. Examine tune-up techniques of all machinery
   2. Tillage practices - reducing energy consumption by reducing tillage or by using alternative tillage practices.
   3. Conserving energy when applying chemicals and fertilizers.
   4. List energy saving practices for putting up haylage or dry hay.
      Example: Keep cutting knives sharp
   5. Mathematic problems related to tractor use of energy
      Example: a. Milking time (dairy)
         b. Harvesting crops
         c. Grinding feed

E. Energy Conservation in engines, small motors and irrigation systems.
   1. List energy saving techniques when using irrigation systems.
      Example: Irrigate during periods of low wind velocity
   2. Selecting farm motors applicable for a job keeping energy in mind.
   3. List energy saving practices for stationary engines on the farm.
      Example: a. Select engine for job
         b. Performing overhauls on small engines (valves, rings)
         c. Avoid unnecessary idling

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F. Energy Conservation Review
   1. Use all lists to understand the idea that farmers (as well as others) are wasting energy on the farm.
   2. Stress the point that conservation is needed to "gain time" in solving our energy problems and the idea that we will eventually run out of fossil fuel.
   3. Set up some sort of energy conservation check students can use around the farm and implement a challenge to incorporate conservation practices whenever possible.

G. Facts, Figures and Notes to be Used With Energy Conservation Curriculum.
   1. The U.S. food system uses about 16-17% of all energy consumed in this country.
   2. Electrical energy provides about 5% of the energy needs of production agriculture.
   3. BTU - quantity of heat required to raise the temperature of one pound of water 1° F
      Kilowatt Hour (Kwh) - 1000 watts measure of electricity
      One gallon of diesel fuel = 136,000 BTU
      One Kwh Electricity = 3412 BTU
   4. Three steps that can be taken to use energy wisely and maintain our standard of living.
      a. Slow down present use of energy.
      b. Improve usefulness and efficiency of present fuels.
      c. Develop new energy sources.
   5. About 25-35% of the energy we use each day is wasted.
   6. Ways to conserve energy:
      a. Combine farm operations
      b. Switch from gasoline to diesel when possible
      c. Turn off lights and equipment when not in use
      d. Reduce driving
      e. Clean machinery and maintain at maximum operating efficiency
   7. A diesel powered tractor is more efficient than a gasoline powered tractor.
   8. Energy saving tillage:
      a. Don't plow deeper than necessary
      b. Combine tillage when practical
      c. Keep plow shares sharp
      d. Plow when soil moisture is favorable
      e. Adjust equipment properly
      f. Change tillage pattern to avoid extra trips
      g. Match tractor to job
   9. Energy saving application of fertilizer and chemicals
      a. Have soil tested regularly
      b. Apply fertilizers to point of diminishing return
      c. Minimize fuel consumption
      d. Choose practices for each individual field
      e. Return crop residue and manure when possible
      f. Use legumes in crop rotation to reduce need of chemical application
   10. Energy saving tips for putting up haylage and hay
      a. Use mower-conditioner combination to reduce trips through field
      b. Keep knives sharp
      c. Make adjustments
      d. Run silo blower at recommended PTO speed
      e. Don't idle tractor longer than needed
      f. Adjust tractor properly
   11. R value refers to ability of material to resist heat passing through it. Higher R value, more effective insulation materials.
   12. Irrigation power constitutes over 40% of energy inputs for irrigated crops.

IV. Motivation

1. Bulletin Board displays
2. Slides, filmstrips and transparencies

V. Learning Activities

1. Field trips to area businesses and industries

VI. Materials Needed

A. Books
   1. *Encyclopedia of Energy*, McGraw-Hill Staff, 1976.
   2. *The Energy Crisis*, Lawrence Rocks & Richard Runjon, 1972.
   3. *Guide to Energy Management in Agriculture*, Jay McCrackin & Windof Wyatt, 1978.

B. Pamphlets
   1. *Energy Conservation Tips*, American Petroleum Institute, 2101 1 Street Northwest, Washington, D.C., 20037 (free pamphlets).

2. *Energy Conservation Experiments You Can Do,* Edison Electric Institute, 90 Park Avenue, New York, New York, 10016. (free pamphlet).
3. *Industrial Energy Conservation,* General Motors Corporation, 3044 W. Grand Blvd., Detroit, Michigan, 48202. (free pamphlet).

C. Films
Energy Conservation in the Home. Energy Films Catalog, Organizing School Energy Contests; all U.S. Department of Energy, Washington, D.C. 20285.

FARM MANAGEMENT

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in farm management and will be able to relate these factors to his/her own specific needs and aspirations.
B. Be familiar with such economic terms as resource, product, land, labor, capital, and management.
C. Apply the principles of marginal physical product, marginal value product, and law of diminishing returns.
D. Interpret the opportunity costs of given products.
E. Be familiar with the input-input and output-output relationships.
F. Comprehend the inter-relationships of the manager's role in farm businesses.
G. Identify the cost concepts which include fixed, variable, total, and marginal costs.
H. Define the revenue and supply concepts in given situations.
I. Recognize the concepts of risk and uncertainty.
J. Relate to the adjustments of uncertainty in given situations.
K. Draw conclusions of alternative methods to predict prices and yields.

II. Concepts to Develop

A. There are career opportunities in farm management for young men and women at all levels of educational preparation.
B. Farm managerial roles include the problem and scope of the management function, administration, and controlling the decision-making process of farm businesses.
C. A knowledge of basic economic principles and the relationship to farm management is necessary.
D. Successful farm operators have developed the ability to set up, use, and analyze farm records.
E. Farm financial records and analysis can be used to solve farm management problems.
F. Long range planning of farm businesses involve budgets, transition and annual planning, and cash flow statements.
G. Control and efficient utilization of capital resources of the farm business is basic to economic independence.
H. An accurate and complete inventory of all crop, livestock, and equipment must be available for management functions.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.

B. Getting established in farming.
  1. Opportunities in farming.
  2. Qualifications needed to become successful farmers.
  3. The need for training and where it may be obtained.
  4. Methods used to become established in farming.

C. Organizing and managing the farm business
  1. Combining the factors of production.
  2. Economic principles and concepts.
  3. Effect of the following on labor income.
     a. Size of business
     b. Crop production
     c. Livestock production
     d. Combining success factors
  4. Farm ownership and credit.
  5. Field arrangement.
  6. Farmstead arrangement.
  7. Farm buildings.
  8. Planning the farm business.

D. The role of the manager
  1. Problems of the manager.

    2. Management is a continuous process.
    3. Decision-making requirements.
    4. Alternative management decisions.
E. Basic economic background
    1. Definition of economic terms.
    2. Classification and definition of resources.
F. Basic economic principles
    1. Product functions.
    2. Law of diminishing returns.
G. Opportunity costs of agriculture
    1. Various opportunity costs.
    2. Applications of opportunity costs.
H. Input and output relationships
    1. Physical relationships of a given product.
    2. Application of opportunity costs.
I. Cost concepts
    1. Various types of costs.
    2. Application of costs.
    3. Profit making decision process.
J. Basic revenue concepts
    1. Three revenue concepts.
    2. Supply concept of a product in reference to price and quantity of output.
K. Risk and uncertainty
    1. Aspects and conditions of risk and uncertainty.
    2. Decision criteria under varying states of knowledge.
    3. Types of uncertainty and risk.
L. Adjustments to reduce uncertainty
    1. Decision concerns of the individual manager.
    2. Conditions of society.
M. Methods for predicting prices and yields
    1. Plan on basis of expected prices and yields.
    2. Determine effect of uncertainty and risk.
N. Other management considerations
    1. Soil conservation and water management.
    2. Farm records and accounts.
    3. Protection from accidents and risks.
    4. Types of farm business organizations.
    5. Business law and legal matters.

IV. Motivation

A. Class discussion with data from actual farms or representative of typical farms in area.
B. Field trips to farms for collection of management data.
C. Develop problems for individual students to solve.
D. Utilize information in current farm literature.
E. Develop problems to be solved by class as a group.
F. Develop farm management games with actual winners being recognized.
G. Utilize guest resource people for class discussions.
H. Field trips to agribusinesses in area.
I. Utilize appropriate films, filmstrips, slides, etc.

V. Learning Activities

A. Occupational experience programs.
B. Survey of home farm.
C. Crop evaluation of enterprises grown on the home farm.
D. Evaluation of feed and balancing rations.
E. Preparation of an income tax estimate.
F. Livestock, crop, and equipment inventories on the home farm.
G. Income tax preparations.
H. Completion and interpretation of the farm business analysis and profit-loss statement-records from example farm.
I. Projection of crop and field plans and relation to livestock needs - home farm.
J. Evaluation of the net worth statement - home farm.
K. Short- and long-range planning estimates - home farm.

VI. Materials Needed

A. Books
    1. Doane's Farm Management Guide. Doane Agricultural Service, Inc. 1979. (Student workbook and teacher's copy available)
    2. Mortenson, W.P. and R.A. Luening. The Farm Management Handbook. The Interstate Printers and Publishers, Inc. 1972.
    3. Schneeberger, Kenneth C. and Donald D. Osburn. Financial Planning in Agriculture. The Interstate Printers and Publishers, Inc. 1977. (Teacher's manual available)
    4. Facts and Figures Handbook For Farmers. Doane Agriculture Service, Inc. 1977
    5. Looney. Estate Planning For Farmers. National Farm Book Company. 1977.
    6. Harl, Neil E. Farm Estate and Business Planning. 1979. National Farm Book Company

B. Pamphlets, bulletins

1. Bjoraker, Walter T. (ed.) "A Course of Study in Farm Management." Instructional Series No. 4, Agricultural and Extension Education Department, University of Wisconsin-Madison.
2. Individual selections from Farm Management area, List of Agricultural Publications, List No. J7AAG, University of Wisconsin-Extension.
3. Individual selections from Agricultural Economics Agdex 800, Ohio Agricultural Education, Curriculum Materials Service, The Ohio State University.
4. Individual selections from Agricultural Economics, Vocational Agriculture Service, College of Agriculture, University of Illinois.

C. Films, filmstrips and slide sets (source examples)

1. Films
   a. "Credit - A Capital Idea," Elliot Film Company, Inc., 2635 Nicollet Avenue, Minneapolis, Minn. 54408
   b. "Estate Planning: Keeping The Farm In The Family," Modern Talking Picture Service, Inc.
   c. "In The Pursuit of Excellence-Agricultural Excellence." Venard Films Ltd., Box 1332, Peoria, IL 61601
2. Filmstrips
   a. "Increasing Earnings Through Farm Records." No. 353A. See B4 for address.

      (Many other titles available under Agricultural Economics)
3. Slide sets
   a. "Agricultural Outlook Charts," No. A-55. United States Department of Agriculture, Washington, D.C.

D. Periodicals

1. Crops and Soils
2. Doane's Agricultural Report
3. Drover's Journal

FARM MACHINERY

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment for advancement in farm machinery service and sales and will be able to relate these factors to his/her own specific needs and aspirations.
B. Outline the principles associated with each unit of operation on tillage, planting, and harvesting farm machinery.
C. Recognize the proper method of repair of farm machinery.
D. Select methods of testing the correct operation of farm machinery.
E. Explain a concept of the procedures of adjusting machinery for most efficient use.
F. Formulate plans for and calibrate machines for accuracy of application.
G. Identify and list the trade publications and agencies which relate to farm machinery repair and usage.

II. Concepts to Develop

A. There are career opportunities in farm machinery service and sales for young men and women at all levels of educational preparation.
B. The proper use of tools is a good work habit.
C. Operator's manuals and shop technical manuals are invaluable.
D. Safety of operation of each implement is essential.
E. Each worker needs a positive attitude toward safety, cleanliness, and neatness of work stations.
F. A farm machinery worker must possess information about materials of construction, strength of materials, proper types and use of bearings, pulleys and belts.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunities for advancement.
   6. Other factors relating to student needs and aspirations.

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B. History and origin of farm machinery industry
  1. Early development.
  2. Present.
  3. Future trends in development.

C. Employment opportunities in the farm machinery field
  1. Opportunities in maintenance.
    a. Farm operator.
    b. Dealer mechanic.
    c. Manufacturer's representative.
    d. Private business.
  2. Opportunities in sales.
    a. Dealer representative.
    b. Manufacturer's representative.
    c. Private business.

D. How machines transmit power
  1. Belt drives
    a. Advantages
    b. Disadvantages
    c. Trouble shooting problems
  2. Chain drives
    a. Types of chain drives
    b. Advantages
    c. Disadvantages
    d. Trouble shooting problems
    e. Repair techniques and procedures
  3. Gear drives
    a. Types of gear drives
    b. Advantages
    c. Disadvantages
    d. Trouble shooting problems
  4. Other types of drives
    a. Reciprocating
    b. Crank wheel and lever
    c. Crank arm and lever
    d. Cam drives
  5. Safety release mechanisms
    a. Slip clutches
    b. Jump clutches
    c. Shear pins

E. Bearings and Seals
  1. Plain bearings or bushings
    a. Solid bearing or sleeve
    b. Thrust bearing
    c. Split bearing
    d. Bearing lubrication
  2. Anti-friction bearings
    a. Ball bearings - types
    b. Roller bearings - types
    c. Needle bearings - types
    d. Lubrication of bearings
  3. Materials bearings are manufactured from
  4. Trouble shooting plain bearings
  5. Bearing maintenance
  6. Premature failures
  7. Seals
    a. Dynamic
    b. Static
  8. Gaskets
  9. Sealants

F. Metals used in farm machinery and equipment
  1. Parts manufactured from carbon steels
    a. Low carbon steel
      1. Hot rolled steel
      2. Cold rolled steel
    b. Medium carbon steel
    c. High carbon steel
    d. Very high carbon steel
  2. Parts manufactured from cast iron
    a. Gray cast iron
    b. Malleable cast iron
    c. White cast iron
    d. Ductile cast iron
  3. Cast steel parts
  4. Drop forging parts
  5. HSLA Steels (High Strength Low Alloy Steels)
  6. Alloy steel parts
    a. How heat treating affects alloy steel parts
      1. Quenching and tempering
      2. Normalizing
      3. Annealing
      4. Stress relieving
  7. Equipment parts manufactured from stainless steels
    a. Milking and milk handling equipment
    b. Processed foods industry
  8. Machine and equipment parts manufactured from aluminum
  9. Repair techniques and procedures
  10. Special electrodes to repair

G. Tires and Tracks
  1. Tire construction
  2. Industry code for tires
  3. Tire inflation
  4. Ballast - slippage
  5. Duals
  6. Tire failures
  7. Radials and tractors
  8. Types of track shoes
  9. Crawler operator tips
  10. Correct track tension and adjustment

H. Types of machinery
  1. Tillage tools.
    a. Primary.
    b. Secondary.
  2. Planting equipment.
    a. Corn.
    b. Oats.
    c. Special. (cash crop)
  3. Harvesting machinery.
    a. Cereal grain.

        b. Corn.
        c. Forage.
        d. Special. (cash crop)
    4. Material handling
        a. Augers, elevators, bunks, bucket elevators.
        b. Dairy equipment.
        c. Manure handling.
        d. Feed processing.
            1) Portable mills.
            2) Electric stationary mills.
        e. Crop drying equipment.
            1) Bin.
            2) Batch.
            3) Continuous.

I. Units of operation of particular machines
    1. Identify unit of operation.
    2. Identify parts of particular unit.
    3. Determine function as a whole unit and with respect to entire machine operation.
    4. Trouble shooting.
    5. Calibration.
    Example: Hay Baler
        a. History and types, trends.
        b. Identification of parts.
        c. Units of operation.
            1) Picking up.
                a) Function.
                b) Parts.
                c) Repair and adjustment.
            2) Feeding mechanism.
                a) Parts.
                b) Function.
                c) Repair and adjustment.
            3) Compressing mechanism.
                a) Parts.
                b) Function.
                c) Repair adjustment.
            4) Tying mechanism.
                a) Parts.
                b) Function and sequence.
                c) Adjustment and checking.
            5) Drive chain and chasis.
                a) Parts.
                b) Function of operation.
                c) Repair and adjustment.

J. Econmomics of machinery
    1. Leasing.
    2. Renting.
    3. Ownership.

K. Safety
    1. Procedures in shop.
    2. Procedures in repairing farm machinery.
    3. Procedures in operating farm machinery.

L. Trends in farm machinery manufacturing.

VI. Materials Needed

A. Books
    1. Farm Field Machinery - Finner - American Printing & Publishing Co., 2909 Syene Road - Madison, Wisconsin
    2. Farm Machinery and Equipment - 6th Edition - Smith & Wilkes - McGraw Hill, New York
    3. Farm Machinery Fundamentals - Finner - American Printing & Publishing Co., 2909 Syene Road - Madison, Wisconsin
    4. Farm Machinery Mechanisms - Hunt & Garver - Iowa State University Press - Ames, Iowa 1973
    5. Farm Power and Machinery Management - Hunt - 6th Edition - Iowa State University Press - Ames, Iowa

Fundamentals of Machine Operation - Deere & Co., Moline, Illinois (Items 6-14)
    6. Agricultural Machinery Safety - 1974
    7. Combine Harvesting - 1973
    8. Crop Chemicals - 1976
    9. Hay & Forage Harvesting Equipment - 1976
    10. Machinery Management - 1975
    11. Planting - 1975
    12. Preventative Maintenance - 1973
    13. Tillage - 1976
    14. Tractors - 1974
    15. Machines for Power Farming - Stone & Gulvin - John Wiley - New York - 1977
    16. Modern Concepts of Farm Machinery Management - Bowen - Stepes Publishing Co. - Champaign, Illinois
    17. Modern Farm Power - 3rd Edition - Promersberger, Priebe, Bishop - Reston Publishing Co., Reston, Va. 1979
    18. Power - Prime Mover of Technology - Duffey - McKnight & McKnight - Bloomington, Illinois
    19. Principles of Farm Machinery - 2nd Edition - Kepner, Bainer, Berger - AVI Publishing Co., Westport, Conn.

B. Booklets, Pamphlets

The following are available from AAVIM - Athens, Georgia

1. Applying Pesticides-1976
2. Ball & Roller Bearings
3. Field Mowers
4. Planning for an Irrigation System-1977
5. Planning Machinery Protection-1978

Fundamentals of Service, Available from *Deere & Co.* - Moline, Illinois

6. Air conditioning
7. Bearings & Seals
8. Belts & Chains
9. Fuels, Lubricants & Coolants
10. Fasteners
11. Mowing & Spraying
12. Shop Tools
13. Tires & Tracks
14. Welding

Following are available from *Hobar Publishing Co.* 1234 Tiller Lane - St. Paul, Minn.

15. Farm Power & Machinery Management
16. Safe Operation of Agricultural Equipment

The *Ohio Agricultural Education Curriculum Materials Service* - Ohio State University - Room 254, 2120 Fyffe Road - Columbus, Ohio - 43210

17. Baler Operation, Service and Maintenance - 1977
18. Combines and Combining - 1970
19. Corn Pickers and Picking Corn - 1970
20. Plows and Plowing - 1969

C. Films

The following films are available from the *BAVI - University of Wisconsin*

1. Agricultural Tractor Safety - 1030 - 22 min. - 1976
2. Bale Knotter - 6987 - 11 min. - 1968
3. Combine Safety - 1034 - 11 min. - 1976
4. Corn Farmer - 5854 - 14 min. - 1960
5. Corn From Bag to Bin - Part I - 5818 - 13 min. - 1964
   Part II - 5819 - 13 min. - 1964
6. Forage Harvest Safety - 1035 - 11 min. - 1975
7. Modern Machinery Planters - 6989 - 9 min. - 1968
8. Wagon Safety - 1042 - 11 min. - 1976

The following films are available from *Allis Chalmers*

9. Double Harness 15 min. - 1976
10. More Power On The Ground - 13 min. - 1972
11. Roar of Power
12. Those Who Know Choose Gleaner Combines - 10 min. - 1974

The following films are available from the *Gehl Co.* West Bend

13. Gehlbaling Hay - 11 min. - 1976
14. Min-All - 10 min. - 1978

The following films are available from *Vernard Films*

15. Breakthrough in Combining - 15 min. - 1977
16. Cowboys and Engines - 1970

Miscellaneous Films

17. Fly On Farming - Associated Films
18. Look To The Harvest - Farm Film Foundation

D. Slides:

Deere & Co. has slide sets available on every subject listed under *Fundamentals of Machine Operation* and *Fundamentals of Service*

Slides on some subjects available from AAVIM & Hobar Publishing

Deere & Co. also has transparency masters available on every subject listed under *Fundamentals of Machine Operation and Fundamentals of Service*

FINANCIAL PLANNING AND ESTATE TRANSFER OF FAMILY HELD BUSINESS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Understand the importance of Estate Planning & Financial Planning.
B. Be familiar with Tax Reforms at the State and Federal levels.
C. Know when, who and why to use professional advisors.
D. Know how to establish meaningful timetables of planned events.
E. Understand the economic environment and the problems and advantages of inflated property values.
F. Make decisions about establishing the business structure. (ie. Partnership, Corporation or sole ownership)
G. Recognize liquidity problems in Estate transfers.
H. Know how to define the gross estate, the adjusted gross estate and the net taxable estate.

I. Determine the possible Federal and State tax consequences at death of existing owners.
J. Evaluate farm real estate and personal property.
K. Know the purpose of Wills and Trusts.
L. Understand the various types of wills and how they work to increase or decrease estate taxes.
M. How to effectively use gifts as an estate transfer vehicle.
N. Properly plan and purchase the proper amount and type of property and casualty insurance.
O. Determine the type and amount of health insurance.
P. Choose the proper deductibles in property, casualty and health insurance to maximize coverage and minimize premiums.
Q. Understand the various types of Life Insurance and how they can be advantageously used to accomplish the family's goals.
R. How Life Insurance should be owned to avoid needless taxation on proceeds.
S. Acquire an understanding of the new Survivor Life Insurance concept as a means to reduce premiums and maximize benefits.
T. Plan an adequate retirement plan through the use of IRS approved tax deductible plans.
U. Understand the steps in the estate planning process and the need for continued review.
V. Have a working knowledge of estate transfer devices.

II. Concepts To Develop

A. Estate planning requires a mature attitude by all parties involved for we all will die someday.
B. If the planning is completed early the overall cash outlay may be greatly reduced.
C. What is absolutely necessary if the family goal is to keep the family business as a "going concern".
D. A constant review is necessary if the plan is to remain current and make use of planned cost or tax advantages.
E. Business families need to plan together if they are going to accomplish their goals.
F. Careful and detailed records should be maintained at all times by all parties involved.
G. The costs of planning are far less than not planning.
H. Farming is big business and should be treated as such.
I. The use or combination of transfer devices for assisting the second generation to ownership and provide the first generation with adequate retirement benefits at minimal taxation.

III. Subject Matter To Teach

A. The Estate Planning Process
    1. Establishing Objectives
    2. Estate Inventory
    3. Choosing the Proper tools
    4. Timely reviews and update
B. The Estate Planning Team
    1. The Attorney
    2. The Life Underwriter
    3. The Trust Officer
    4. The CPA
    5. You
C. Timetables for Planning
    1. 1st Generation
    2. 2nd Generation
D. Estate Taxation
    1. Federal Estate Tax Reforms
    2. State of Wisconsin Inheritance Taxes
    3. Gift Taxation
    4. Capital Gains taxation
E. Economic Changes
    1. Interrelated problems of inflation and it's effect on personal property and land values.
    2. Cash flow problems within the business
    3. The financial affects of an untimely owner-operator death or disability.
    4. Taxation at progressive tax table levels.
        a. Income Taxes
        b. Death Taxes
F. Business Structure
    1. Sole Ownership
    2. Partnerships
    3. Corporations
G. Self analysis of potential cash or liquidity problems at death.
    1. Establishing the gross estate
    2. Establishing the adjusted gross estate (deductions)
    3. Establishing the net taxable estate
H. Determine the possible tax consequences at death
    1. Marital deduction for spouses
    2. Financial consideration rule for jointly held properties
    3. Tax credit at Federal level
    4. Computation of Federal Estate taxes
    5. Estimate calculation of State inheritance taxes

- I. Determination of property values
  - 1. Real estate and building
  - 2. Personal property
  - 3. Other valued holding
  - 4. Fair market value
- J. The Purpose of Wills and Trusts
  - 1. Types of wills
  - 2. Living trusts
  - 3. Testamentary trusts
  - 4. Drafting wills and trusts
- K. Advantages and disadvantages of Gifts
  - 1. Purposes of Gifts
    - a. Gifts to spouses
    - b. Gifts to children
    - c. Gifts to charities
  - 2. What properties to be given
  - 3. Annual exclusion allowance gift
  - 4. Life time gifts
  - 5. Tax consequences of gifts
- L. Purchasing property and casualty insurance on the business
  - 1. Insuring to value
  - 2. Co-insurance and how it works
  - 3. The use of deductibles to reduce premiums
  - 4. Maximum liability limits
- M. Purchasing health and disability insurance
  - 1. Examine the renewable features of the policy
  - 2. Maximize total coverage
  - 3. Keep pace with inflating medical costs
  - 4. Use of deductibles to reduce premium
- N. Understanding the use of Life Insurance & the various types of Life Insurance
  - 1. Term Insurance
  - 2. Permanent Insurance
    - a. The concept of buying money for the future
    - b. Insurance is not an investment
    - c. The advantage of the level premium concept in whole life products
  - 3. Ownership of Life Insurance
    - a. Third party to avoid taxation
    - b. Insurable interest of owner
    - c. The advantage of personally owned insurance over credit life on medium sized and larger loans
- O. The new Survivor Life Insurance Concept for Family Owned Businesses
  - 1. One contract for more than one Life
  - 2. Benefits paid on the last insured to die
  - 3. Underwriting advantages
  - 4. Ownership flexibility
  - 5. Reduced insurance costs.
  - 6. Using annual exclusion gifts to third parties to pay premiums
- P. Planning an adequate retirement
  - 1. Planned liquidation of present assets
  - 2. Using tax deferred plans
  - 3. Immediate and lasting income tax advantages
  - 4. Choice of funding products
    - a. Certificate of deposits
    - b. Mutual funds
    - c. Stocks and Bonds
    - d. Annuities
- Q. Vehicles of Estate Transfer
  - 1. Purchase by land contract
    - a. Inhibit the inflation problem
    - b. Lower interest rate
    - c. Lower down payment
    - d. Valuation break
  - 2. Gifts
    - a. Annual exclusion gifts
    - b. Tax Free $3,000 per year per person
    - c. Life time gifts - taxed on value now - not 20 years later
  - 3. Out-right purchase
    - a. High interest charges
    - b. High down payment
    - c. Tax disadvantage to seller - capital gain

IV. Motivation

- 1. Field trip to county court house
- 2. Field trip to local financial institutions
- 3. Resource speakers

V. Learning Activities

- 1. Complete an estate liquidity analysis on the home farm or business

VI. Materials Needed

- A. Books
  - 1. "Keeping What's Yours" (Farm & Ranch Edition)
    John R. Grahm, PH.D.
    Charles S. Arthur, III.
    R. L. De Bruyn & Associates - Publisher
    Leadership Lane
    Manhattan, Kansas 66502
  - 2. Estate Planning Idea Book
    Published by Farm Journal, Inc.
    West Washington Square
    Philadelphia, PA 19105
- Supplemental Reading Material
  - 1. Family Estate Planning In Wisconsin
    University of Wisconsin Extension B 1442

2. Tax Sheltered Retirement Plans On Farm Investments
   North Central Regional Extension Publication
   Extension Publication No. 55 - 1978
   University Extension Service
3. Income Tax Management For Farmers
   North Central Regional Extension Publication No. 2
   University Extension Service
4. Have You Planned Your Estate
   B 7790627
   University of Wisconsin Extension Service
5. Farm Business Arrangements: - Which One For You?
   Extension Bulletin: 401
   Extension Service - University of Minnesota
6. Long Term Installment Land Contracts
   North Central Regional Extension Publication Number 56
   University of Wisconsin Extension Service

Resource
   Farm Bureau Service Centers
   Liquidity Analysis Forms for Classroom Project Work Unit
   Some Service Centers Possess Computer Service for Estate Analysis

FLORICULTURE

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the floriculture industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Identify and explain the differences, advantages and disadvantages of different floral shops.
C. Be able to appreciate how the floriculture industry has developed during different periods of time.
D. Identify and name the different tools and materials used in flower arranging and their use.
E. Determine the different types of containers to use for various occasions.
F. Identify specific types of flowers used in floral arrangements.
G. Determine sources of cut flowers in your area.
H. Care for cut flowers properly.
I. Determine what types of flowers are appropriate for various occasions during the year.
J. Identify, understand and put into practice the basic principles of floral design.
K. Gather necessary items, assemble, calculate, and complete billing invoices, and wrap different types of floral arrangements.
L. Determine the appropriate body flowers for different occasions.
M. Identify and use recommended tools when making corsages.
N. Gather necessary items, assemble, calculate, and complete billing invoices and wrap corsages.
O. Identify characteristics of different types of weddings.
P. Determine the cost of wedding items.
Q. Identify styles, select flowers, and foliage, assemble, and price wedding bouquets.
R. Select appropriate funeral arrangements.
S. Gather necessary items, assemble, calculate, and complete billing invoices, and wrap funeral arrangements.

II. Concepts to Develop

A. There are career opportunities in floriculture for men and women at all levels of educational preparation.
B. Students should be able to distinguish between the differences, advantages, and disadvantages, costs and setups of different types of retail florist shops.
C. An appreciation of the history of flower arranging.
D. A working knowledge of the tools and materials is essential for good floral design.
E. Floral designs are made up of specific types of lowers.
F. Cut flowers require specific care.
G. A good source of materials locally is essential.
H. There are specific flowering potted plants, floral arrangements, etc., for various seasons and occasions.
I. All designs follow specific basic floral design principles.
J. Final product of a designer ends with the billing and packaging of the design.
K. There are corsages for different occasions.

L. Tools used in corsage making are different from floral design tools.
M. Cost of corsages are determined by the materials used.
N. There are different types of weddings that require different floral setups.
O. Wedding bouquet styles vary.
P. A funeral has many different types of floral sets involved.

III. Subject Matter to Teach

A. Careers in the retail florist business
  1. Professional jobs (teachers)
  2. Managerial and supervisory jobs
  3. Technical jobs (designers)
  4. Service workers (salesman, deliveryman)
B. Types of retail flower shops
  1. Average flower shops
  2. High class shops
  3. Retail-grown combination shops
  4. College town shops
  5. Shopping center flower shops
  6. Hospital shops
  7. Cash and carry shops
  8. Hotel shops
  9. Apartment house flower shops
  10. Department store shops
  11. Bachman's European flower market
  12. Mini-shops
C. History of flower arranging
  1. Oriental flower arrangements
  2. European flower arrangements
  3. Modern American arrangements
D. Tools and equipment used in flower arranging
  1. Knives, shears, and scissors
  2. Pinholders
  3. Florist clay
  4. Floral foams
  5. Floral tapes
  6. Florist wires
E. Containers
  1. Low bowls and oblong forms
  2. Square containers
  3. Cylindrical and rectangular shaped forms
  4. Pitcher and urn shaped forms
  5. Flared and natural vases
  6. Plain vs. decorated containers
  7. Neutral vs. bright colored containers
  8. Simple vs. unusual shaped containers
  9. Size and texture of containers
F. Selection of flowers
  1. Line flowers
  2. Round or focal flowers
  3. Filler flowers
  4. Greens
G. Source and care of flowers
  1. Where and how to buy flowers
  2. The cost of buying flowers
  3. Lifespan, maturity stages, and stem length of flowers
  4. When and how to cut flowers
  5. How to condition flowers
  6. How to maintain flower arrangements
H. Uses and characteristics of flowers, plants, and decorative materials
  1. Cut flowers
  2. Flowering pot plants
  3. Foliage plants
  4. Florist greens
I. Basic principles of floral design
  1. Design
  2. Line
  3. Form
  4. Texture
  5. Color
  6. Harmony
  7. Focal point
  8. Balance
  9. Proportion and scale
  10. Rhythm
  11. Repetition
J. Types of arrangements
  1. Centerpeice arrangements
  2. Round and oval arrangements
  3. Crescent arrangements
  4. "S" curve arrangements
  5. Symmetrical arrangements
  6. Assymetrical arrangements
  7. Rectangle arrangements
  8. Diagonal arrangements
  9. Zig-Zag arrangements
  10. Vertical arrangements
  11. Spiral arrangements
  12. Basket arrangements
  13. Bud vases
  14. Fruit basket arrangements
  15. Dish gardens (terrariums)
  16. Other
K. Corsages
  1. Determining body flowers for:
    a. Holidays
    b. Special occasions
    c. Birth
    d. Sickness
    e. Death
    f. Weddings
    g. Religious occasions
    h. Social group organizations
    i. Hobbies
    j. Costume materials
    k. Men vs. women flowers
    l. The wearer - age, size, and personality
  2. Tools for corsage making:
    a. Water picks
    b. Wire sizes and their use

        - c. Floral tapes
        - d. Floral paints and dyes
        - e. Netting
        - f. Ribbon (kinds, sizes, and colors)
        - g. Corsage pins (kinds and sizes)
        - h. Chenille stems
        - i. Decorative novelties and materials
    - 3. Types of corsages
        - a. Shoulder corsages
        - b. Neckline corsages
        - c. Wrist corsages
        - d. Waist corsages
        - e. Hair corsages
        - f. Nosegay corsages
        - g. Novelty corsages
- L. Weddings
    - 1. Kinds of weddings
        - a. Very formal weddings
        - b. Formal weddings
        - c. Semi-formal weddings
        - d. Informal weddings
    - 2. Customs and expenses
        - a. Wedding customs that have developed through the ages
        - b. Bride's expenses
        - c. Groom's expenses
        - d. Optional expenses
        - e. Other
    - 3. Wedding bouquet styles
        - a. Bride's bouquet
        - b. Bridesmaid flowers
        - c. Ring bearer and flower girl flowers
        - d. Corsages and boutonnieres
        - e. Church and altar flowers
        - f. Reception flowers
- M. Funerals
    - 1. Selection of funeral arrangements
        - a. Time of year
        - b. Sex
        - c. Age of person
        - d. Local customs
        - e. Other
    - 2. Types of funeral arrangements
        - a. Baskets
        - b. Sprays
        - c. Wreaths
        - d. Religious and conventional designs
        - e. Fraternal designs
        - f. Other

IV. Motivation

- A. Field trips to floral shops, greenhouses, funeral parlors, and wholesale flower shops
- B. Bulletin board display
- C. Slides, movies, and filmstrips

V. Learning Activities

- A. Occupational experience programs
- B. Survey local community to determine the kind and number of flower shops in the area
- C. Field trips to different types of flower shops
- D. Make bulletin board displays of different styles of arrangements.
- E. Demonstrate the use of floral design tools
- F. Prepare a display of containers
- G. Diagram arrangements for various containers
- H. Identify line, round and filler flowers used in arrangements
- I. Determine the quality of different blooms of flowers
- J. Collect pictures and specimens of different types of flowers
- K. Condition flowers for arranging
- L. Maintain arrangements for longer periods of time
- M. Identify potted plants, foliage plants, and greens
- N. Prepare arrangements and corsages using the basic principles of arranging as their guidelines
- O. Develop a display of floral books and pictures
- P. Demonstrations by florists of different arrangements and corsages
- Q. Interviews and class presentations in the subject matter area

VI. Materials Needed

- A. Books
    - 1. Editors of Better Homes and Gardens, *Flower Arranging*, Better Homes and Gardens, New York, 1965
    - 2. Ascner, *The Complete Flower Arranger*, Simon and Schuster, New York, 1974
    - 3. Gordon, *Professional Flower Arranging For Beginners*, Arco Publishing Co., Inc., 1972
    - 4. Shinno, *Flower Arranging by Tat*, Lane Books, Sunset Publishing, 1965
    - 5. Kurpinski, *Design Guidelines I and II*
    - 6. *Berninger, Flower Arranging*, 15C Illustrated Concepts, Berninger, Madison, Wisconsin, 1972
    - 7. Hixsow, *Flower Arranging*, Keisen Engei Center, Japan, 1971
    - 8. Benz, *Flowers: Geometric Form*, San Jacinto Publishing Co., Texas, 1973

9. Pfahl, *The Retail Florist Business*, the Interstate Printers and Publishers, Danville, Illinois, 1968
10. Mullins, *Flowers and Symbols for the Christian Year*, Hearthside Press, Inc., Publishers, New York, 1967
11. Clark, *The New Book of Wedding Flowers, Decorations, and Etiquette*, Hearthside Press, Inc., Publishers, New York, 1970
12. Tolle, *Floral Art for Religious Events*, Hearthside Press, Inc., Publishers, New York, 1969
13. John Henry Co., *Flowers in Action*, John Henry Co., 1971
14. Society of American Florists, *Care and Handling of Flowers and Plants*, Merchants Publishing Co., 1976
15. John Henry Co., *She Walks in Beauty*, John Henry Co., 1971
16. Rittners, *Vase Arrangements for the Professional Florist*, Rittners, Boston, 1966
17. Rittners, *Silver Anniversary Book*, Rittners, Boston, 1966
18. Rittners, *Flowers for the Modern Bride in Living Color*, Rittners, Boston, 1966
19. Palmer Scaulon, *Album of Designs: Funeral Flowers*, Florist's Publishing Co., Chicago, Ill., 1968
20. Estes, *Floral Design, Student Learning Plan*, Harper and Row, 1976

B. Slides and Transparencies

1. California State Polytechnic College Filmstrips, San Luis Obispo, Cal., 93401
    - a. Flower Arranging - Beginning Techniques
    - b. Flowers to Wear - I, II, III
2. NASCO, Fort Atkinson, "Film Loops"
    - a. Tools, Materials, and Accessories for Flower Arranging
    - b. The Vertical Flower Arrangement
    - c. The Horizontal Arrangement
    - d. The Triangular Arrangement
3. Ohio Agricultural Education, Curriculum Materials Catalog, Room 254, 2120 Fyffe Road, Columbus, Ohio, 43210
    - a. Dried Materials
    - b. Flower Arranging
    - c. Easter Lilies
    - d. Cut Flowers
    - e. Design Greens
    - f. Flowering Potted Plants
    - g. Floricultural Crops
    - h. Annuals
    - i. Perennials
    - j. Poinsettia
    - k. Geranium
    - l. What is Horticulture?
    - m. Foliage Plants
4. Teaching Materials Catalog, Vocational Ag. Service, College of Agriculture, University of Illinois, 434 Mumford Hall, Urbana, Ill., 61801, phone, 217-333-3870
    - a. Slide Sets
        - S601 Garden Flowers - Annuals, pt. I
        - S602 Garden Flowers - Annuals, pt. II
        - S610 Foliage Plant Identification, pt. I
        - S611 Foliage Plant Identification, pt. II
        - S612 Foliage Plant Identification, pt. III
    - a. Subject Matter Units
        - #5007 Growing Plants Indoors
        - #5009 Arranging Flowers in Vases and Bowls
        - #5010a Growing Flowering Annuals
        - #5011 Poinsettias, Care and Propagation
        - #5013 Producing Poinsettias Commercially
        - #5014 Growing Lilies
        - #5018 Operating a Retail Flower Shop
        - #5019 Care of Flowering Pot Plants in the Home
        - #5020 Reblooming Flowering Gift Plants

FORAGES, LEGUME

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the production of legume hay crops and plant science and will be able to relate these factors to his/her own specific needs and aspirations.

B. Contrast the protein content and yield of legumes and non-legumes.

C. Discuss the climatic and soil requirements of legumes.

D. Compare the seeding rates of the various legumes.
E. Contrast the plant characteristics of legumes grown in the area.
F. Discuss management practices which result in high yields and longevity of the crop.
G. Contrast the suitability of commonly grown legume crops for hay, pasture, silage and green manure.
H. List and discuss the varieties of legumes available to area farmers.
I. Choose varieties of the various species of legumes with the best performance potential for the area.
J. Explain the procedure and benefits derived from innoculating legumes.
K. Describe the characteristics of a good seedbed.
L. Contrast plant food deficiency symptoms.
M. List and compare seeding methods.
N. Comprehend the reasons for depth of seeding of the various legume species.
O. List and explain the causes and practices which can be used to reduce winterkilling.
P. Describe the relationship between crop maturity and nutritive value.
Q. Explain recommended management practices.
R. Discuss conditions which favor a good yield of seed.
S. Contrast harvesting methods of legume crops
T. Describe the symptoms and measures used in controlling the diseases of legume hay crops.
U. Discuss the characteristics, the damage caused and select effective insect control measures.

II. Concepts to Develop

A. There are career opportunities in plant science and crop production for young men and women at all levels of educational preparation.
B. Legumes grow best on soils which are neutral or slightly alkaline.
C. Legumes can be grown under widely varying climatic conditions.
D. Varieties differ in their resistance, cold tolerance and seed production.
E. Inoculation of legumes helps to assure healthy stands.
F. A firm seedbed is essential for good germination of legume seed.
G. Overworking the seedbed is a very undesirable practice.
H. Legumes respond significantly to applications of lime and fertilizers.
I. Trace elements are needed for normal growth of legumes.
J. Luxury feeding is an unwise practice.
K. Shallow seeding contributes to a good stand of legumes.
L. A corrugated roller seeder is an efficient and effective implement to use in planting small seeded legumes.
M. Seeding rates of legume species vary considerably.
N. Proper management of legumes contributes to high yields and longevity of the crop.
O. Pollinating insects play an important role in the production of legume seed.

III. Subject Matter to Teach

A. Importance and distribution
    1. Origin of the crop.
    2. Area where grown.
    3. Present acreage and trends.
    4. Reasons for its popularity.
    5. Disadvantages of each species of legumes
B. Characteristics
    1. Plant description - height, hardiness, longevity, leaf and root characteristics.
C. Soil and climate requirements
    1. Fertility needs.
    2. Type of soil, depth, drainage, sensitivity to acid.
    3. Range of climatic conditions.
    4. Moisture requirements.
D. Selecting the seed
    1. Varieties of each legume species.
    2. Varietal differences with respect to yield, habit of growth, quality of hay, resistance to cold, drought, and disease resistance.
    3. Origin of seed and its importance.
    4. Characteristics of certified seed.
E. Culture of legumes
    1. Reasons for inoculating legumes.
    2. Preparation of the seedbed.
        a. Characteristics of a good seedbed.
        b. Implement to use in preparing the seedbed.
    3. Soil acidity, its effect on the establishment and yields of legumes.
    4. Proper pH level and materials to use for correcting acidity.
    5. Soil sampling and testing.
    6. Kind and amount of fertilizer to apply.
    7. The importance of trace elements.
    8. Method and time of sowing.
    9. Rate and depth of sowing.
    10. Plant food deficiency symptoms.
    11. Methods of harvesting and maintaining crop quality.

F. Managment of legumes
   1. Hay production - number of cuttings and when to cut.
   2. Plant maturity relationships.
   3. Pasture production - time and extent of grazing.
   4. Reducing the danger of bloat.
   5. The fertility program and its relationship to yield and longevity of stands.
   6. Winter killing - its causes and practices used to reduce losses.

G. Diseases
   1. Cause
   2. Symptoms.
   3. Prevention.
   4. Control measures.

H. Insects
   1. Characteristics of the insect.
   2. Method of injuring the plant.
   3. Symptoms of the injured plant.
   4. Control measures.

I. Careers
   1. Current and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

IV. Motivation

A. Films, filmstrips and slides.
B. Charts.
C. Bulletin board displays.
D. Field trips to area farms.
E. Field trips to test trials.

V. Learning Activities

A. Occupational experience program including all phases of production.
B. Prepare mounts of crop and seed specimens.
C. Collect and prepare mounts of plants damaged by insects.
D. Collect and prepare mounts of diseased plants.
E. Collect root specimens of legumes.
F. Perform germination tests.
G. Collect, identify and prepare mounts of leaf specimens.

VI. Materials Needed

A. Books
   1. Bear, et al. *Hunger Signs in Crops.* American Society of Agronomy, Washington, D.C. 1949.
   2. Brickbauer & Mortenson. *Approved Practices in Crop Production.* Interstate. 1967.
   3. Delorit & Ahlgren. *Crop Production.* 4th ed. Prentice-Hall, 1973.
   4. Hughes, Henson, Metcalfe & Johnson. *Crop Production.* MacMillan Company. 1957.
   5. Wilson & Richter. *Producing Farm Crops.* National Farm Book Co., Omro, Wisconsin. 1960.
   6. Hughes, Heath, and Metcalfe. *Forages.* Iowa State University Press, Ames, Iowa, 1967.

B. Bulletins
UW-Extension
FORAGES

A2906	Characteristics of forage legumes and grasses
R2762	Arlington red clover
A2676	Take-all disease of cereals and grasses
2590	Oats for forage
A2550	A complete forage plan for Wisconsin livestock
A2477	Grow legumes for green manure
A2466-1	Profitable forages update packet
A2457	Crownvetch for erosion control and profit
A2363	Birdsfoot trefoil
A2216	Verdant timothy
R2214	Forage quality of alfalfa harvested by calendar date and plant maturity schedules in MO, IA, & MN.
A2042	Sac smooth bromegrass
A1928	Sudangrass and other sorghums for forage (C 638)
A1860	Red clover varieties in Wisconsin (SC 77)
A1827	Identifying grasses in Wisconsin turf (SC 69)
A1696	Bromegrass (C 563)
A1546	Sweet clover in Wisconsin
A1453	Seed treatments to control small grain and forage diseases
AF2241	Sudangrass and sorghum - sudangrass hybrids for forages

FORAGE PRODUCTION

R2908	Performance of four grasses grown alone, with nitrogen, alfalfa or birdsfoot trefoil at Ashland
A2907	Maintaining forage stands for efficient production
A2656	How to build a front and side opening wagon rack for tossed bales
A2448	Alfalfa fertilization

A2368	Put power in your pasture with nitrogen
R2190	Pasture renovation in southwestern Wisconsin (RR 65)
R1741	Establishing and managing alfalfa
A1525	Forage crop varieties and seeding mixtures for 1979
A1250	Wisconsin needs better pastures
A1119	Supplementary and emergency forage crops
A1102	Establishing and safeguarding forage seedings

FORAGE PROTECTION

A2905	Winter injury to forages
A2805	Prevent hay mow and silo fires
A2682	Weed control in established alfalfa and other forage legumes
A2156	Alfalfa insect pests
A1981	Pest control in forages and small grains—1979

FORAGE UTILIZATION

A7780109	Forage tests and computerized balanced rations really pay
R2893	More beef from improved pastures of the driftless area of the upper Mississippi Valley
A2590	Oats for Forage
R2552	Distribution of dry matter & chemical constituents among plant parts of 6/temperate origin grasses
B2539	When it comes to protein, nothing beats alfalfa
A2460	Forages for horses
A2309	Take a good forage sample
R2251	A comparison of haylage and wilted grass silage plus hay in the dairy cow diet
2034	Economic evaluation of forage handling systems (B 590)
A1885	Alfalfa for low moisture silage 'LMS'
A1880	Grow more protein at home with high quality alfalfa an excellent livestock feed & cash crop
A1871	Watch out for silage gas
A1250	Wisconsin needs better pastures
A1119	Supplementary and emergency forage crops
AF2186	Making and feeding hay-crop silage

C. Films—BAVI

1.	"Alfalfa Story"	5460
2.	"Establishing Alfalfa"	3630
3.	"Let's Make Quality Forage	2804

FORAGES, NON LEGUME

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the production of non-legume hay crops and plant science and will be able to relate these factors to his/her own specific needs and aspirations.

B. Compare the protein content and yields of non-legume and legume hay crops.

C. Describe the climate and soil requirements of non-legumes.

D. Contrast the seeding rate of several non-legume hay crops.

E. Explain the plant characteristics of non-legume hay crops grown in this area.

F. Contrast the suitability of commonly grown non-legume crops for hay, pasture, silage, and green manure.

G. Discuss the species of non-legume hay crops which are commonly grown in the area.

H. Select varieties of the various species of non-legumes which are commonly grown for hay and have the best yield potential.

I. List and discuss the characteristics of a good seedbed.

J. Recognize plant food deficiency symptoms in non-legume hay crops.

K. List and compare seeding methods.

L. Explain the relationship between crop maturity and nutritive value.

M. Describe recommended management practices which result in the production of high yields and longevity of stands.

N. Describe conditions which favor a good yield of seed.

O. Discuss the relative importance of disease and insects in the production of non-legume hay crops.

II. Concepts to Develop

- A. There are career opportunities in plant science and crop production for young men and women at all levels of educational preparation.
- B. Non-legume hay crops are often poorly managed.
- C. Some non-legume hay crops are more productive when grown with a legume.
- D. A cultipacker seeder does an excellent job of seeding non-legume hay crops.
- E. Non-legume hay crops grow best on fertile, well drained soils.
- F. Proper fertilization is necessary for the establishment and maintenance of good stands of non-legumes.
- G. Non-legume hay crops may also be used for pasture and silage.
- H. A firm seedbed is essential for good germination.
- I. Seeding rates of non-legumes vary.
- J. Luxury feeding is an unwise practice.

III. Subject Matter to Teach

- A. Importance and distribution
  - 1. Origin of the species.
  - 2. Areas where grown.
  - 3. Present acreage and trends.
  - 4. Reason for its popularity.
  - 5. Disadvantages of the various species of non-legumes grown for hay.
- B. Characteristics
  - 1. Plant description - height, hardiness, longevity, leaf and root characteristics.
- C. Soil and climate requirements
  - 1. Type of soil.
  - 2. Soil drainage and its effect on plant growth.
  - 3. Fertility needs.
  - 4. Temperature and moisture conditions.
- D. Crop culture
  - 1. Time of sowing
  - 2. Use of companion crops.
  - 3. Seeding mixtures.
  - 4. Rate of seeding.
  - 5. Depth of seeding.
  - 6. Fertilization - rates of application and kinds of fertilizer used.
  - 7. Preparation of the seedbed.
  - 8. Plant food deficiency symptoms.
- E. Uses of the crop
  - 1. Hay production.
    - a. Management practices.
  - 2. Pasture production.
    - a. Management practices.
  - 3. Silage.
    - a. Relative value.
  - 4. Seed production.
    - a. Where produced.
    - b. Method of harvesting.
    - c. Care in harvesting.
- F. Diseases
  - 1. Relative importance.
  - 2. Extent of damage to the plant.
  - 3. Control measures.
- G. Insects
  - 1. Relative importance.
  - 2. Damage to the plant.
  - 3. Control measures.
- H. Careers
  - 1. Current and future employment needs.
  - 2. Job description.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relating to student needs and aspirations.

IV. Motivation

- A. Films, filmstrips and slides.
- B. Charts.
- C. Bulletin board displays.
- D. Field trips to area farms and test plots.

V. Learning Activities

- A. Occupational experience program including all phases of production.
- B. Prepare mounts of crop and seed specimens.
- C. Prepare mounts of diseased plants.
- D. Collect root specimens of non-legume hay crops.
- E. Perform germination tests.
- F. Collect, identify and prepare an exhibit of leaf specimens.

VI. Materials Needed

- A. Books
  - 1. Brickbauer & Mortenson. *Approved Practices in Crop Production.* Interstate. 1967.
  - 2. Delorit & Ahlgren. *Crop Production.* 4th ed. Prentice-Hall, 1973.
  - 3. Hughes, Henson, Metcalfe & Johnson. *Crop Production.* MacMillan Company. 1957.
  - 4. Hughes, Heath, & Metcalfe. *Forages.* Iowa State College Press. 1951.
  - 5. Wilson & Richter. *Producing Farm Crops.* National Farm Book Co., 1960.
- B. Bulletins
  - 1. Non-Legume Forages, University of Wisconsin-Extension

A2906	Characteristics of Forage Legumes and Grasses
A2676	Take-All Diseases of Cereals and Grasses

81

A2590 Oats For Forage
A2216 Verdant Timothy
A2042 Sac Smooth Bromegrass
A1928 Sudangrass and other Sorghums Forage (C 368)
A1696 Bromegrass (C563))
AF2241 Sudangrass and Sorghum - Sudangrass Hybrids for Forages
A1828 Growing Orchardgrass in Wisconsin (SC70)

2. *Forage Production*
R2384, "Influence of Nitrogen Fertilization on the Performance of an Alfalfa-Bromegrass and Bromegrass Grown Alone"
A2368, "Put Power in Your Pasture with Nitrogen"
R2196, "Performance of Bromegrass, Orchardgrass and Reed Canary Grass Grown at Five Nitrogen Levels and with Alfalfa" (RR 69)
R2190, "Pasture Renovation in Southwestern Wisconsin" (RR65)
R1966, "Response to Kentucky Bluegrass (Poa Pratensis L. Strains to Fertility and Management" (RR 20)
A1525, "Forage Crop Varieties and Seeding Mixtures"

3. *Forage Utilization*
R2251, "A Comparison of Haylage and Wilted Grass Silage plus Hay in Dairy Cow Diet" (RR 78)

C. Films
1. "Grass — The Big Story," 2946. BAVI
2. "Grass Roots in the Soil," 3537. BAVI

FUTURE FARMERS OF AMERICA

I. Performance Objectives

Upon completion of the unit the student will be able to

A. Understand the relationship of FFA to agricultural education.
B. Be familiar with the history and development of the FFA organization.
C. Comprehend the structure and organization of the FFA.
D. Discuss the aims and purposes of the FFA.
E. Describe the requirements for FFA membership and degree qualifications.
F. Explain the duties and responsibilities of chapter members and officers.
G. Function effectively in chapter meetings as an officer or member.
H. List and discuss the essentials of a good chapter.
I. Help plan and implement a chapter program of work.
J. Assist in the planning and conducting of school and community youth meetings.
K. Function more effectively in public speaking activities.
L. Help plan and conduct an awards program or parent and member banquet.
M. Explain the FFA contests and awards program.
N. Develop a spirit of cooperation, a desire to be of service to others, and to prepare for useful citizenship.
O. Discuss local, state, and national activities.
P. Function as a leader in the chapter, school, and community.
Q. Develop a deeper understanding and appreciation for the American Flag and our American Heritage.
R. Select an agriculture career based on a comprehensive understanding of the agriculture industry.
S. Develop and demonstrate a proficiency in the agriculture industry.
T. Use the agricultural occupation experience program to become established in his/her chosen agricultural occupation.

II. Concepts to Develop

A. FFA contributes significantly to the overall development of rural and urban youth alike.
B. FFA is intra-curricular with agricultural education.
C. FFA serves as a laboratory to "learn by doing" the many things taught in the classroom.
D. FFA seeks to develop in members the democratic style of leadership.
E. Awards are made available to members through the FFA foundation.
F. Every member involvement in chapter activities contributes to student interest and chapter achievement.
G. The development of public speaking skills enhances the effectiveness of a leader.
H. Goals and objectives are an important component of the yearly chapter program of work.

- I. Contests provide members with the opportunity to demonstrate skills learned in the classroom and in occupational experience program activities.
- J. Awards contribute significantly to student self concept and interest in the program.
- K. The awards program recognizes proficiency in several areas in addition to farming.
- L. Wholesome competition is a fundamental basis for progress.

III. Subject Matter to Teach

- A. Agricultural education and the FFA
    - 1. Relationship of FFA to agricultural education, Public Law 740.
    - 2. Importance to the local school.
    - 3. Chapter contributions to the school and community.
    - 4. State and national associations.
- B. History and development
    - 1. Significance of the National Vocational Education Act.
    - 2. Purposes of agricultural clubs prior to 1928.
    - 3. Founders of the FFA.
    - 4. Impact of early national livestock judging contests.
    - 5. How the FFA became an organization.
    - 6. Code of ethics.
    - 7. Proper use of the official jacket.
- C. Operation of the FFA organization
    - 1. Symbols, emblem, and colors of the organization.
    - 2. Financing and how the organization is governed.
    - 3. Local, state, and national officers.
    - 4. Role of adults in the organization.
    - 5. Aims and purposes.
    - 6. Motto and creed of the organization.
    - 7. Dues structure.
    - 8. Organizational chart.
    - 9. Administrative chart.
- D. Membership and degrees
    - 1. Kinds of membership and policies.
    - 2. Degrees of active membership and qualifications.
    - 3. Pins and symbols.
- E. Leadership
    - 1. Styles of leadership.
    - 2. Formal and informal leadership.
    - 3. Qualities desired in a person.
    - 4. Functions of democratic leadership.
    - 5. Opportunities for development.
    - 6. Role of local, state, and national organization in promoting leadership.
    - 7. The importance of team work.
- F. Personal & Social Development
    - 1. Personal appearance
    - 2. Proper behavior and manners
    - 3. Social code of ethics
    - 4. Annoying traits to avoid
    - 5. Getting along with people
    - 6. Working with people
    - 7. Starting and maintaining conversations
    - 8. Being a good listener
    - 9. Telephone conversations
    - 10. Introductions
- G. Public Speaking
    - 1. Development of a speech
        - a. Selection of a subject
        - b. Obtaining references
        - c. Preparation of the speech
        - d. Delivery
        - e. Visual aids & body language
        - f. Proper breathing
        - g. Pronunciation and enunciation
        - h. Grammer usage
    - 2. Types of speeches
        - a. Memorized
        - b. Deliberative
        - c. Extemporaneous
- H. Duties and responsibilities of FFA officers and members
    - 1. Incentives to become a participating member.
    - 2. Qualities of an effective member.
    - 3. Qualities of an effective officer.
    - 4. Duties of chapter officers.
    - 5. Leadership activities for officers and members.
    - 6. Officer responsibiltiy in conducting program of activities and chapter meetings.
    - 7. Chapter, state, and national officer qualifications.
- I. Planning and conducting chapter meeting
    - 1. Chapter equipment.
    - 2. Meeting room arrangement.
    - 3. Planning the agenda.
    - 4. Order of business.
    - 5. Responsibilities of members and officers.
    - 6. Opening and closing ceremony.
    - 7. Essentials of a chapter meeting.
    - 8. Minutes and financial records.
    - 9. Symbols of each office.
    - 10. Proper parliamentary procedure (refer to parliamentary procedure)
- J. Chapter program of activities
    - 1. The executive committee.
    - 2. Guidelines in selecting activities.
    - 3. Planning a program of activities.
    - 4. Calendar of activities.

5. National awards program for chapters.
6. Program of activities, goals, ways and means.
7. FFA Alumni Association
8. The value of committees.
9. Responsibility of the chairman in carrying out activities.
10. Responsibilities of committees in carrying out activities.
11. Committees responsibility for evaluating activities.

K. National foundation and awards program
    1. Available contests.
    2. Value of participation.
    3. Developing student confidence.
    4. Basic levels of recognition given in the FFA.
    5. Relationship of the National FFA Foundation, Inc. to FFA.
    6. Objectives, eligibility, and sponsoring of each award.
    7. Past chapter contests and award achievement.
    8. Awards available for non-farm members.
    9. Means of raising award funds.

L. Parent and member banquet
    1. Reasons for holding a banquet.
    2. Member participation.
    3. Planning and conducting the banquet.
    4. Committee responsibilities.
    5. Role of the advisor in planning and conducting a banquet.
    6. Role of a state FFA officer.

M. National FFA activities and functions
    1. Functions conducted on the national level.
    2. Opportunities at the national level.
    3. National convention proceedings.
    4. National leadership and citizenship conference proceedings.
    5. Future Farmer Supply Service.
    6. The National Future Farmer Magazine.
    7. The official calendar
    8. Reasons for state and national convention.
    9. Career show at the national convention.
    10. International Education Programs.

N. The American Flag.
    1. History and development of the American Flag.
    2. Proper Flag display.
    3. Respect for the American Flag.
    4. Handling the Flag.
    5. Proper way of pledging allegiance to the Flag.
    6. Official proportions of the American Flag.
    7. Laws governing the use and treatment of the Flag.
    8. Meaning of the stars and stripes and the three colors.
    9. Proper disposal of a worn out Flag.
    10. Reasons for flying a flag at half mast.

IV. Motivation

A. Chapter visits and presentation by state or national officer.
B. Bulletin board display.
C. Films, slides and filmstrips.
D. FFA scrapbook.
E. Field trips to former outstanding FFA members.
F. Display trophies and plaques won by the chapter in the classroom.
G. Former award winners speak to the class on the benefits of participating in the FFA contest and awards program.
H. Display FFA chapter supply catalogue.
I. Display award applications on the chapter bulletin board.
J. Prominently display official FFA magazine and the official FFA calendar.

V. Learning Activities

A. Class members develop a list of how FFA contributes to agricultural education objectives.
B. Class members develop a list showing the relationship between FFA contests and activities and various phases of vocational agriculture.
C. Students complete a leadership traits checklist.
D. Conduct a creed speaking contest.
E. Prepare an organizational chart to show how the FFA is governed.
F. Students review award applications.
G. Class presentation by an executive committee member on how to plan a meeting.
H. Class members demonstrate proper table manners and etiquette.
I. Hold a parliamentary procedure team contest.
J. Review state and national program activities.
K. Develop a large chart of the chapter program of activities and display it in the chapter room.
L. Use a tape recorder and allow each student to hear his/her FFA speech on tape.

M. Class members demonstrate proper use of the telephone.

N. Students practice making formal introductions.

O. Conduct a parent-member FFA banquet planning exercise.

P. Students demonstrate the proper method of folding the flag.

Q. Conduct Food For America Program

VI. Materials Needed

A. Books

1. *A More Effective FFA.* Wall. Interstate.
2. *Forward FFA.* W.A. Ross. Future Farmers Supply Service. Alexandria, Virginia 22309.
3. *Handbook on Speech for Future Farmers.* Purkey. Interstate.
4. *How to Hold a Better Meeting.* Snell. Herper & Brothers.
5. *Practical Activities for Future Farmers.* Tenney. Interstate.
6. *Programs for Future Farmer Chapter Meetings.* Tenney. Interstate.
7. *Public Speaking for Future Farmers.* Judson. Interstate.
8. *Robert's Rules of Order.* Available in most book stores.
9. *Speak With Ease.* Ross. National Farm Book Co.
10. *The FFA and You.* Bender, Clark and Taylor. Interstate.
11. *When You Preside.* Sutherland. Interstate
12. *Your Opportunities in Vocational Agriculture.* Phipps. Interstate.
13. *FFA Student Handbook,* PCA, National Supply Service, Alexandria, Virginia
14. *FFA Advisors Handbook,* PCA, National Supply Service Alexandria, Virginia
15. *History of Vocational Agriculture in Wisconsin,* Doering, DPI, 125 South Webster Street, Madison, Wisconsin, 53702

B. Periodicals or Manuals

1. *A Handbook for National FFA Officers.* Gray. National FFA Center, Alexandria, Va. 22309.
2. *A Handbook for Conducting FFA Meetings.* (Preliminary Parliamentary Procedure.) Russell. Interstate.
3. *FFA Official Manual.* Future Farmer Supply Service. Alexandria, Va. 22309
4. *National Convention Proceedings.* National Executive Secretary, National FFA Center, Alexandria, Va. 22309.
5. *Now You're Talking.* Interstate.
6. *FFA At Work For Safety.* National FFA Center, Alexandria Va. 22309.
7. *The Future Farmer Organization: What It Is - What It Does.* Future Farmer's Supply Service, Alexandria, Va 22309.
8. *Vocational Agriculture - FFA.* Future Farmer's Supply Service, Alexandria, Va. 22309.
9. *Advisor's Handbook on Proficiency Awards.* National FFA Center. Alexandria, Va. 22309.
10. *Parliamentary Procedure For the FFA Member,* Joestgen, DPI, 125 S. Webster Street, Madison, Wisconsin, 53702.

C. Pamphlets

1. "You and Your Flag." Channing L. Bete Co., Greenfield, Massachusetts.
2. "Awards For You." National FFA Center, Alexandria, Va. 22309.
3. "Discuss It, Plan It, Do It." Circular 445, Pennsylvania State University, University Park, Pa.
4. "Future Farmers of America Foundation Awards." National FFA Center.
5. "Leadership in Group Discussion." Gray. National FFA Center.
6. "Leadership of Youth Groups." Farmland Industries, Kansas City, Mo.
7. "So You Want To Be An Officer In The FFA." Bail. Bulletin 40, New York State College, Ithaca, NY.
8. "Pageant Script: History of Vocational Education." Gray. National FFA Center.
9. Pageant Script: "History of Old Glory." Gray. National FFA Center.
10. "Leadership and Citizenship Conferences." National FFA Center.
11. "International Education Information." National FFA Center.
12. Booklets Relating to Congress, Government, Communism, etc. Channing L. Bete Co., Greenfield, Massachusetts.
13. "I Am The American Flag." Gray. National FFA Center.
14. Parliamentary Dial, Haugen, National Agraphic, P. O. Box 69, Oconta, New York

D. Films and Filmstrips
1. "FFA Stars Over America"
2. "BOAC"
3. "The Inheritors"
4. "Four Star Farmers"
Above films available from: Venard Films, Box 1332, Peoria, Illinois 61601
5. *"The How in Parliamentary Procedure."* Interstate.
6. Slide Series on FFA Operations. Update.
Series A — FFA Flexible and Relevant
Series B — Supervised Experience
Series C — Cooperation
Series D — Community Service (BOAC)
Series E — Leadership — What Is It?
Series F — Earnings and Savings (Fund raising)
Series G — Conduct of meetings
Series H — Scholarship
Series I — Recreation
Series J — Public Relations
Series K — State and National Activities
Series L — A Close Look at FFA National
Series M — FFA: Youth With A Purpose (Why Join FFA)
Order from: A. B. Cordes, Department of Public Instruction, 125 S. Webster Street, Madison, Wisconsin 53702
7. Learning and the Land (Venard Films, Box 1332, Peoria, Ill. 61654
8. FFA, Agriculture's New Generation
9. 1978 Stars Over America
10. 1979 Stars Over America
11. FFA Alumni-slide set & script (U.W.—Madison, Platteville or River Falls or A. B. Cordes, DPI, 125 S. Webster Street, Madison, Wisconsin 53702
12. Food for America
13. National Convention Highlights
14. FFA in Safety

GREENHOUSE MANAGEMENT

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in floriculture and greenhouse management and will be able to relate these factors to his/her own specific needs and aspirations.

B. Define greenhouse management and list a minimum of five occupations in the area of greenhouse management.

C. Identify the specific floricultural businesses in the local area.

D. Be familiar with the employment opportunities available in greenhouse management for different geographical areas of the nation.

E. Demonstrate his/her ability to use the "Dictionary of Occupational Titles" by looking up an assigned D.O.T. number and title.

F. Identify and compare the plant growing structures in the community.

G. Identify and analyze the appropriateness of various materials for growing structures.

H. Make a sketch which includes size and materials, bench placement, heating, CO_2 and ventilating features, light orientation, humidity and temperature control, and cooling and watering equipment.

I. Compare costs of various types of structures using glass, plastic, and fiberglass.

J. Solve a problem relating to creating the condition needed to grow five common greenhouse plants having different environmental requirements.

K. Compute the cost of production when the kind and number of plants, spacing, and selling data are given.

L. Identify the common parts of plants, using either a diagram, or actual plant specimens.

M. Define the common terms relating to plant identification and growth habits and develop the vocabulary needed to describe them.

N. Use the Bionomial system of nomenclature in discussion and identification of common plant materials as directed by the instructor.

O. Explain how plant characteristics can be used for the purpose of identification.

P. Identify ten differences in plants as it relates to plant characteristics.

Q. Identify twenty common plants grown in the greenhouse by examination of actual plants or pictures.

R. Identify at least 15 common vegetable or flower seeds.

S. Identify the various types of growing media.

T. Discuss the characteristics of a growing medium.

U. Explain the methods of soil sterilization.

V. Demonstrate the proper methods of watering plants.

W. Describe the various types of fertilizers.

X. Prepare a soil sample for laboratory analysis.

Y. Demonstrate the methods of fertilizer application.

Z. Discuss the importance of controlling light, temperature, humidity, and air.

AA. Explain the importance of controlling light, temperature, humidity, and air.

BB. Compare the different principles and practices involved in the study of plant propagation.

CC. Discuss the basic factors involved in producing plants sexually from seed, including seed selection, growing media, temperature, light, and moisture.

DD. Explain the basic factors involved in producing plants asexually, including the plant selection, media, temperature, light, and moisture.

EE. Identify the internal structure of plants in order to understand the root and shoot development of cuttings.

FF. Describe the parts of specialized buds, stems, and roots.

GG. Compare the purposes and methods of propagating plants asexually.

HH. Demonstrate the various methods and techniques of propagating plants by cutting.

II. Demonstrate the various methods and techniques of propagating plants by layering.

JJ. Explain the various methods and techniques of propagating plants by division.

KK. Demonstrate the various methods and techniques of propagating plants by grafting and budding.

LL. Contrast the various types of plant growth substances.

MM. Organize, maintain, and interpret records pertaining to a horticultural business.

NN. Evaluate and use the numerous trade catalogs and supplementary literature.

OO. Evaluate the products from a written description.

PP. Keep all records needed to manage a greenhouse.

QQ. Understand and fill out business forms used in ordering and receiving merchandise.

RR. Interpret and develop a production schedule which includes growing temperature, initial sales date, and sowing dates.

SS. Determine the production costs of greenhouse plants.

II. Concepts to Develop

A. There are career opportunities in greenhouse management and floriculture for young men and women at all levels of educational preparation.

B. Job description, working conditions, and personal qualifications vary with the various greenhouse occupations.

C. The retail floral industry consists of many small businesses with gross sales in excess of a billion dollars annually.

D. Job opportunities in floriculture and greenhouse management vary in different sections of the country.

E. Certain plants require specific structures for optimum growth.

F. Materials used in greenhouse construction should be durable, corrosion resistant, light in weight, inexpensive and be easily installed.

G. Greenhouses can be heated by using hot water, steam or forced hot air.

H. Several devices are available for controlling humidity in the greenhouse and for watering the plants.

I. There are several types of greenhouses which utilize glass, fiberglass, and plastic in its construction.

J. Light intensity and its duration must be controlled in the greenhouse.

K. Carbon dioxide levels influence plant growth.

L. Greenhouse ventilation is most frequently accomplished by using fans.

M. A greenhouse worker must be knowledgeable about plant identification, cultural practices, plant components and seeds.

N. A broad horticultural vocabulary is desirable for those working in a greenhouse.

O. Common and scientific names are used in plant identification.

P. The plant characteristics of stems, leaves, roots, flowers, fruit seed, sap, aroma, growth habits, size and form are valuable aids in identification.
Q. Classification keys are a valuable aid in plant identification.
R. Plants grown in the greenhouse vary in their cultural requirement.
S. Growing medias must have certain characteristics like firmness, porosity pH, water holding capacity, weed and disease freedom.
T. Light, temperature, humidity and ventilation are important considerations in the operation of a greenhouse.
U. Organic and inorganic fertilizer are essential for plant growth.
V. Plants grown in the greenhouse can be propagated in several ways.
W. Plants have specialized internal structures such as organs, tissues, and cells.
X. Asexual reproduction is a valuable tool in preserving true varieties and in reproducing plants which grow slowly from seeds.
Y. A successful greenhouse operator needs extensive knowledge and complete records.
Z. The production schedules of a greenhouse operation must be developed in relationship to marketing demands.
AA. Production costs are directly related to net profit.
BB. Spacing practices, temperature, watering, fertilizing and types of containers all have an effect on production costs.

III. Subject Matter to Teach

A. Careers
  1. Occupation or job titles.
  2. Type and level of education required.
  3. Working conditions.
  4. Personal qualifications needed.
  5. Employment opportunities.
  6. Scope of floriculture industry - local - state - nation.

B. Constructing, using, and maintaining plant growing structure
  1. Functions of structures.
  2. Types of greenhouses.
  3. Other types of growing structures.
  4. Greenhouse construction materials.
  5. Heating greenhouses.
  6. Watering devices and humidity control.
  7. Ventilation.
  8. Light control.
  9. Temperature control.
  10. Co_2 influences.
  11. Bench materials and design.
  12. Maintenance of greenhouse.
  13. Greenhouse sizes and costs.

C. Plant material identification.
  1. Reasons for plant identification.
  2. Terms used to describe horticulture plants.
  3. Binomial system.
  4. Scientific nomenclature.
  5. Plant identification characteristics.
  6. Methods of identifying plants.

D. Greenhouse plant cultural requirements
  1. Types of growing media.
  2. Characteristics of growing media.
  3. Soil or media sterilization.
  4. Water application.
  5. Fertilization.
  6. Soil sampling and testing.
  7. Light requirement.
  8. Temperature requirements.
  9. Humidity control.
  10. Air movement.
  11. Pest control and use of chemicals.

E. Propagation of common greenhouse plants
  1. Science and act of propagation.
  2. Sexual reproduction and advantages.
  3. Asexual reproduction, methods, and advantages.
  4. Internal plant structures.
  5. Root development and root types.
  6. Types of buds.
  7. Stem types.
  8. Taking and preparing cuttings.
  9. Rooting cuttings successfully.
  10. Methods of layering.
  11. Plant division.
  12. Grafting.
  13. Budding.
  14. Plant growth regulators.

F. Production costs and marketing.
  1. Record keeping.
  2. Daily records.
  3. Operating statements.
  4. Balance sheets.
  5. Trade catalogues.
  6. Ordering materials.
  7. Various forms used.
  8. Production schedules.
  9. Production costs.
  10. Spacing practices.
  11. How, when, and where to market.
  12. Pricing of the product.
  13. How to deal with customers.

IV. Motivation

A. Laboratory exercises or greenhouse projects.
B. Field trips to local greenhouses and retail outlets.

C. Bulletin board displays.
D. Filmstrips, films, and slide sets.
E. Resource speakers.

V. Learning Activities

A. Skills to be learned in an occupational experience program:

1. From an index of job titles prepare a list of occupations in the floricultural and greenhouse management cluster nation-wide, state-wide, and county-wide.
2. Have students use the colored slides that are designed to acquaint the students with the various types of jobs in ornamental horticulture.
3. Students interview greenhouse workers concerning their jobs.
4. Students clip and report on "help wanted" ads from large city newspapers. These should be in the horticulture job clusters.
5. Students complete a hand out sheet on the use of the "Dictionary of Occupational Titles."
6. Students look up and report on advanced training programs available in the ornamental horticulture job cluster.
7. Survey the types of structures used in the area for floriculture.
8. List materials used in greenhouse construction.
9. Make a list of specifications for a specific greenhouse.
10. Collect commercial data (catalogues, etc.) on equipment available.
11. Obtain facilities and equipment cost figures from local dealers.
12. Grow plants under varying environmental conditions.
13. Work a sample problem based on data supplied on number of plants, spacing, and selling date.
14. Make drawings and label parts of a plant (roots, stems, seeds, fruit, flowers, etc.).
15. Examine various plants; compare and identify their parts.
16. On a study sheet define a list of terms relating to plant identification.
17. Collect examples of plants to demonstrate terms on study sheet.
18. Have students turn in a short report describing a plant of their choice using the vocabulary being studied.
19. Determine common botanical names of plants commonly found in the greenhouse.
20. Using the binomial system convert common names of horticultural plants to scientific or vice versa.
21. Have students bring in specimens and properly identify flower type, stem, type of leaf, and root.
22. Collect specimens of plants that show characteristics discussed in class.
23. Identify plants brought in by the instructor.
24. Students make a collection of seed and nursery catalogs for help in plant identification.
25. Students make a collection or booklet of colored pictures of flowers and other greenhouse plants.
26. Have students review identification of plant material by viewing filmstrips or slides (Example — "Annuals Illustrated").
27. Have the students make a collection of the common seeds used in the greenhouse and identify them.
28. Students learn to identify seeds from samples in plastic packs (materials available from Vitality Seed Co.).
29. Lay out physical samples of each growing medium.
30. Grow plants in soils of various texture (clay, loam, sand) and compare different cultural practices.
31. Demonstrate the drainage of water and water holding abilities of various media.
32. Students mix up a growing mixture that will be used for growing a plant.
33. Demonstrate a soil porosity test.
34. Set up a time-labor schedule showing the different costs for keeping a flat weeded as compared to one which has been sterilized.
35. Students sterilize media by means of both chemicals and heat.
36. Demonstrate results of different frequencies of application of water on plants.
37. Demonstrate the proper methods of watering plants.
38. Display diagrams of methods of watering.
39. Lay out physical samples of organic and inorganic fertilizers.

40. Grow plants under normal fertilization and others under deficiency conditions. Observe reaction of plants.
41. Display a fertilizer sack, check its analysis and write a report on the nutrients supplied by it.
42. Students collect and test soil samples.
43. Demonstrate how liquid fertilizer solutions are made up.
44. Demonstrate the effect of proper, excess, and deficient light, temperature, humidity and air on plants.
45. Demonstrate phototropism in plants.
46. Demonstrate water needs of a plant grown in different relative humidities.
47. Demonstrate the effects of temperature on plants subjecting them to different degrees of temperature.
48. Identify insects, weeds, and diseases on plants grown in the area.
49. Have students write identifiable characteristics of insects, weeds and diseases.
50. Display sample bags and/or containers of chemicals, pointing out the following:
    a. Active ingredients.
    b. Inert ingredients.
    c. Warning label.
51. Students display diagrams showing various propagating structures.
52. Have students write a paper on propagation.
53. Look through seed catalogs and see types of seeds, prices, growing structure, etc.
54. Display a diagram which shows how a seed is produced.
55. Prepare a growing media for germinating seeds.
56. Prepare a table showing all plants that can be propagated asexually and method of propagation.
57. View transparencies showing different methods of propagation.
58. Demonstrate how environmental factors affect rooting.
59. Prepare a series of illustrations indicating the parts of a herbaceous and woody stem.
60. Prepare and display live specimens of herbaceous and woody stems.
61. Display live specimens of buds, stems, and roots, discuss their functions and identify parts orally or in writing.
62. Prepare a written report on the reasons for asexual reproduction of plants including advantages and disadvantages.
63. Demonstrate to the class how a cutting is made using the following methods and plants as examples:
    a. Stem cutting
        1) Coleus
        2) Chrysanthemum
        3) Geranium
    b. Leaf cutting.
        1) Begonia rex
        2) African violets
        3) Peperonia
    c. Root cutting.
        1) Red raspberry
        2) Holly
64. Display diagrams on layering methods and have students draw each method.
65. List plants that can or must be propagated by division and indicate the method used.
66. Use gibberellic acid on geranium blossoms before they open. Compare the difference between control and experimental group.
67. Treat seeds with gibberellic acid at different concentrations and compare plants as to size and color.
68. Display various types of growth regulators. Have students write a paper on the use of each type.
69. Students report on reasons why management must have records.
70. Students develop a current list of materials on horticultural subjects.
71. Students develop a personal library and notebook of bulletins and reference materials.
72. Students to review and report on current magazines and journals in the horticulture areas.
73. Students plan and order the material needed to raise a crop of bedding plants.
74. Study sample business forms.
75. Simulate a day's operation of a greenhouse and have students fill out forms that are usually used.

76. All classroom and laboratory projects that require supplies and materials would be ordered on forms similar to those used in a greenhouse.
77. Students fill out sample checks, receipts, and sale tickets for the above problem.
78. Analyze a production schedule obtained from a local greenhouse.
79. Students develop a complete production schedule for all plants they will be growing in the greenhouse.
80. List the items that make up production costs.
81. Calculate cost of bench space using different pot spacing for geraniums. (Apply thumb rules.)
82. Calculate the cost of production for a crop of geraniums started from rooted cuttings started on February 15th and ready for initial sale by May 15. Other sales dates to be determined by spacing and temperature.
83. Develop a marketing strategy that is related to holiday periods and other peak periods.
84. Set up advertising schedule to be used in conjunction with the marketing strategy.
85. Having completed the production schedule and having a marketing strategy, determine the price that must be charged to make a reasonable profit.
86. Relate marketing strategy to competition, quality of merchandise, and economic conditions in the area.

VI. Materials Needed

A. Books
1. Ball. *The Ball Red Book.* Geo. J. Ball Company. 1975
2. Ball. *The Ball Bedding Book.* Geo. J. Ball Company. 1977.
3. Blake. *Greenhouse Gardening for Fun.* William Morrow and Company Inc., 1967
4. Clapham. *The Greenhouse Book.* Drake Publishers Inc., 1974
5. Ecke Pointsettias. *The Pointsettia Manual.* Paul Ecke Company. 1974
6. Laurie, Kiplinger and Nelson. *Commercial Flower Forcing.* McGraw Hill. 1969
7. Mastaierz. *The Greenhouse Environment.* Brantwood Publications.
8. Nelson. *Flower and Plant Production in the Greenhouse.* Interstate Printers and Publishers. 1967
9. Nelson. *Greenhouse Management.* Interstate Publishers and Printers. 1973
10. Pierce. *Greenhouse Grow How.* Brantwood Publications.
11. Nelson. *The Greenhouse Grower.* Brantwood Publications.
12. Potter. *Bedding Plants.* Florist Pub. Co., 1972
13. Welch. *Mist Propagation and Automatic Watering.* Faber and Faber. 1973

B. Bulletins and Pamphlets
Available from U.W. Extension
Building Hobby Greenhouses AAB 357
How to grow African Violets A1483
Growing Flowering Annuals AG 91
Insects and Related Pests of House Plants AG 67
Summer Flowering Bulbs AG 151
Spring Flowering Bulbs BG 136

C. Catalogues
1. George Ball Inc., West Chicago, Ill. 60185
2. Farmer Seed and Nursery Co., Faribault, Minn.
3. Jungs Seed Co., Randolph Wisc.
4. NASCO, Fort Atkinson, Wis.
5. Northrup King Seeds, Bedding Plant Dept., 1500 Jackson St. N.E. Minneapolis, Minn. 55413
6. Olds Seed Co., Madison Wis.
7. The Vitality Seed Co., 4115 Jackson Road, Ann Arbor, Mich. 48103
8. Wayside Gardens Co., Mentor, Ohio 44060

D. Slides, Filmstrips and Film Loops
1. California Polytechnical State College
   Greenhouse Maintenance
   Bedding Plant Production
   Growing Cacti and Succulents
   Propagating Ornamental Plants
   Fertilizing Ornamental Plants
   Growing Media for Ornamental Plants
2. NASCO
   (Film Loops)
   Potting
   Transplanting
   Softwood Cuttings
   Flats and Equipment
   (Film Strips)
   How to Build a Window Sill Greenhouse
   Propagating Ornamental Plants
   Growing Media for Ornamental Plants

3. University of Illinois

   Propagation of Evergreens

   Propagation of Deciduous Plants

   Planting and Care of Hanging Baskets

   Greenhouse - Uses and Design

4. University of Ohio

   Greenhouses and Related Structures

   Floricultural Crops

   Pointsettias

   Geraniums

   Cut Flowers

   Flowering Potted Plants

   Easter Lilies

E. Lab and Class Manuals

1. California Polytechnical State College. *Growing Container Plants.* California Polytechnical State College.
2. University of Ohio. *The Greenhouse Worker.* University of Ohio.
3. Pennsylvania State University, Ag. Dept., *Greenhouse Crop Production.* Pennsylvania State University. 1971
4. Williams *Greenhouse Flowers and Bedding Plants.* Interstate Publishers and Printers. 1975

F. Subject Matter Units

1. Berninger. *Annuals Illustrated.* NASCO
2. Berninger. *Horticulture Concepts.* NASCO
3. California Polytechnical State College. *Ornamental Horticulture Guidelines* California Polytechnical State College, San Luis Obispo, California.
4. University of Illinois

   Producing Plants by Asexual Propagation

   Pointsettia Care and Propagation

   Producing Pointsettias Commercially

HORSE SCIENCE

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in horse science and production and will be able to relate these factors to his/her own specific needs and aspirations.

B. Have an understanding of the history of the horse and the horse industry.

C. Analyze the uses and functions of the horse in the modern world.

D. Perform basic stable management practices, such as: record keeping, grooming, feeding, hoof trimming, parasite control, etc.

E. Write proper descriptions of a horse's color and markings for registration purposes.

F. Use basic horse terminology and anatomy.

G. Develop a basic skill in judging halter and equitation classes.

H. List different types, correct use, and proper care of horse equipment.

I. Be able to perform basic training practices for horses at halter or under saddle.

J. Know the approximate cost of owning and stabling a horse.

II. Concepts to Develop

A. There are career opportunities in horse science and production for young men and women at all levels of educational preparation.

B. The horse has performed many functions for man throughout its history of domestication.

C. Basic stable management practices such as training, feeding, grooming, and record keeping are important parts of horse science.

D. Registration procedures are determined by national breed associations.

E. Horses can be differentiated by quality through the development of judging skill.

F. Horsemen use correct terminology.

G. Each piece of equipment is designed for a specific purpose and must be used properly.

III. Subject Matter to Teach

- A. Careers
  - 1. Current and future employment needs.
  - 2. Job description.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relating to student needs and aspirations.
  - 7. Uses and importance of horses in agriculture.
- B. History and development of the horse industry
  - 1. The evolution of the horse.
  - 2. Modern breeds of horses.
- C. The anatomy of the horse.
  - 1. Bone structure.
  - 2. Judging horses.
  - 3. Age and height of horses.
  - 4. Unsoundness and blemishes.
  - 5. Action of the horse.
- D. Breeds and uses of different types of horses
  - 1. Light horses.
    - a. ponies (less than 56 inches).
    - b. horses (greater than 56 inches).
  - 2. Draft horses, mules, and donkeys.
- E. Breeding horses
  - 1. Genetics.
  - 2. Breeding Systems.
  - 3. Mating procedures.
  - 4. Parturition.
  - 5. Care for the mare and foal.
  - 6 Artificial insemination.
- F. Feeding horses
  - 1. Digestive system.
  - 2. Composition of feed stuffs.
  - 3. Developing rations.
- G. Building and equipment storage
  - 1. Types of structure.
  - 2. Costs of structure.
- H. Disease and parasite control
  - 1. Types of diseases and parasites.
  - 2. Cause, prevention, and treatment.
- I. Horsemanship
  - 1. Handling the horse.
  - 2. Proper type and care of equipment.
  - 3. Basic riding and driving tips.
  - 4. Grooming and care of horses.
  - 5. Management tips.
  - 6. Costs of owning a horse.

IV. Motivation

- A. Field trips to various stables.
- B. Demonstrations of proper management practices.
- C. Breed films and slides.
- D. Attend a horse show.
- E. Bulletin board displays.

V. Learning Activities

- A. Occupational experience programs.
- B. Students do a paper on costs of owning a horse, equipment, and stabling for one year.
- C. Students do research on their favorite breed of horse.
- D. Demonstrations on management practices or equitation.

VI. Materials Needed

- A. Books
  - 1. Ball. Saddle Up. Farm Journal, 1970.
  - 2. Ensminger. Horses and Horsemanship. Interstate, 1977.
  - 3. Ensminger. Horses! Horses! Horses! Pegasus Co.
  - 4. Ensminger. Tack! Tack! Tack! Pegasus Co.
  - 5. Gorman. The Western Horse. Interstate, 1967.
  - 6. Hayes. Points of the Horse. Arco Publishing, 1969.
  - 7. Jones and Bogart. Genetics of the Horse. Edward Brothers, 1971.
  - 8. Kays. The Horse. A. S. Barnes. 1969.
  - 9. Patten. The Light Horse Breeds. A. S. Barnes. 1960.
  - 10. Williamson. Breaking and Training the Stock Horse. Caxton Printers.. 1971.
  - 11. "How to Buy a Healthy Horse". Conn, 1972, 6th Edition National Farm Book Co., 458 Waukau Road, P.O. Box 458, Omro, WI 54963.
  - 12. Kelly "Dealing With Horses". National Farm Book Co.
  - 13. Molesworth "Knowing Horses". National Farm Book Co.
  - 14. Kays "The Horse, Judging, Breeding, Feeding, Selling Etc., National Farm Book Co. Omro.
  - 15. Rendel "The Horse Book" National Farm Book Co. 1960.
  - 16. Ulmer and Juergenson "Approved Practices in Horse Raising and Handling" National Farm Book Co. 1974.
  - 17. Ensminger "Animal Science". National Farm Book Co. 1977.
- B. Periodicals
  - 1. Horse and Rider, Covina, California.
  - 2. The Draft Horse Journal, Waterloo, Iowa.
  - 3. The Western Horseman, Colorado Springs, Colorado

C. Pamphlets and Breed Informaion From Associations

1. American Appaloosa Association, Inc.
   6471 East Lancaster
   Fort Worth 12, Texas
2. American Hackney Horse Society
   527 Madison Avenue
   New York 27, New York
3. American Indian Horse Registry, Inc.
   Box 949, Blythe, California
4. American Part-Blooded Horse Registry
   2073 S. W. Park Avenue
   Portland, Oregon
5. American Paint Quarter Horse Association
   104 Citizen's National Bank
   Abilene, Texas
6. American Paint Stock Horse Association
   623 South Henderson Street
   Fort Worth, Texas
7. American Quarter Horse Association
   2736 West 10th
   Amarillo, Texas
8. American Saddle Horse Breeder's Association
   929 South 4th Street
   Louisville, Kentucky
9. American Shetland Pony Club
   Box 1250 Lafayette, Indiana
10. American Shire Horses Association
    Box 421, Olympia, Washington
11. American Suffolk Horse Association
    Box 421, Olympia, Washington
12. Appaloosa Horse Club, Inc.
    Box 403, Moscow, Idaho
13. Arabian Horse Club Registry of America, Inc.
    332 South Michigan Avenue
    Chicago, Illinois 60604
14. Belgian Draft Horse Corporation of America
    Box 353, Wabash, Indiana
15. Buckskin Registry Association
    Box 772, Anderson, California
16. Chickasaw Horse Association, Inc.
    Love Valley
    Statesville, North Carolina
17. Clydesdale Breeder's Association of the United States
    Batavia, Iowa
18. Caliceno Horse Breeder's Association
    711 People's Bank, Tyler, Texas
19. Half-Arab and Anglo-Arab Registry
    244 East Olive Avenue
    Burbank, California.
20. Icelandic Pony Club and Registry, Inc.
    56 Alles Acres
    Greeley, Colorado
21. International Arabian Horse Association
    224 East Olive Avenue
    Burbank, California
22. Morgan Horse Club, Inc.
    Box 2157, West Hartford 17, Connecticut
23. Palomino Horse Association, Inc.
    22049 Devonshire Street
    Chatsworth, California
24. Palomino Horse Breeders of America, Inc.
    Box 249, Mineral Wells, Texas
25. Percheron Horse Association of America
    R. No. 1, Fair Oaks, Indiana
26. Pinto Horse Association of America, Inc.
    R. R. 1, Box 155
    Ellington, Connecticut
27. Pony of America Club, Inc.
    31 First Street, N. E.
    Mason City, Iowa
28. Spanish Mustang Registry, Inc.
    Box 148, Lewisburg, Tennessee
29. Tennessee Walking Horse Breeder's and Exhibitor's Association of America
    Box 87, Lewisburg, Tennessee
30. The America Albino Horse Club, Inc.
    Box 79, Crabtree, Oregon
31. The American Gotland Horse Association
    220 East Parkway
    Columbia, Missouri
32. The Jockey Club
    300 Park Avenue
    New York, New York 10022
33. The Missouri Fox Trotting Horse Breed Association, Inc.
    Ava, Missouri
34. The National Quarter Horse Registry, Inc.
    Raywood, Texas
35. United States Trotting Association
    Columbus 15, Ohio
36. Welsh Pony Society of America, Inc.
    Box 419 B
    Unionville, Pennsylvania

D. Slides

1. "The Skill of Horseshoeing"

2. "Bits and Bitting"
3. "Bridles and Bridling"
4. "Haltering and Tying"
5. "Pleasure Trail Riding"
6. "Color and Color Inheritance"
7. "Horse Nutrition"
8. "Catching and Leading"
9. "Impact of the Horse on the U.S. Economy"
10. "Horse Safety"
    Slides available from: Bill J. Pierick, Youth Development,
    610 Langdon Street
    Madison, WI 53706
    May Purchase Slides From: Animal Science Dept., S. W. Sabin, 132 Morris Hall, Corness Univ., Ithica, New York 14850.

E. Films
1. Breeds and Origin of the Horse
    - a. "The Horse in North America." No 2997, BAVI
    - b. "The Horse America Made" American Saddle Horse Breeders Association. No. 9221.
    - c. "The Registered American Shetland Pony." American Shetland Pony Club. LaFayette, Indiana.
    - d. "Shetlands Can Live Anywhere." American Shetland Pony Club.
    - e. "Kids and Shetlands." American Shetland Pony Club.
    - f. "Introduction to the Arabian Horse." RCA's Films.
    - g. "Arabians Are Fun." RCA's Films.
    - h. "The Appaloosa Horse" Murray Deattly Film Production.
      9000 Sunset Boulevard
      Los Angeles, California.
    - i. "The Morgan Horse." The Morgan Club, Inc.
    - j. "Ride Cowboy Ride." No. 1010 and 1011. BAVI
    - k. "Off and Running." No. 0966. BAVI
    - l. "Quarter Horse at Halter, Roping, Cutting and Reining." No. 0961. BAVI
    - m. "The Proud Breed." RCA's Films
    - n. "Cowboy, The" BAVI No. 0802
    - o. "Horsefarm" BAVI No. 3149
    - p. "Of Horses and Men" BAVI No. 2235
    - q. "On the Fifth Day" BAVI No. 9220
    - r. "Thesis Harness Racing" BAVI 0607
2. Selection and Care
    - a. "Horseshoeing." BAVI
    - b. "Horses and Bets." USDA
    - c. "Greentree Thoroughbred." Animal Husbandry Department.
      Washington State University, Pullman, Washington.
    - d. "Introduction to Conformation." American Shetland Pony Club.
    - e. "Venezuelan Equine Encephalomyelitis" BAVI No. 8494
    - f. "No Hoof - No Horse" BAVI No. 9183
    - g. "Judging Mares at Halter" BAVI No. 0263
3. Fitting and Training
    - a. "Horses' Gaits." RCA's Films
    - b. "Kids and Kolts." RCA's Films
    - c. "Horse Sense." BAVI
    - d. "A Diamond in the Rough." American Shetland Pony Club, Lafayette, Ind.
    - e. "4-H Horsemanship; RCA's Films.
    - f. "Horsemanship; Youth and the Quarter Horse." No. 0951 and 0952. BAVI
    - g. "Horsemanship, Mr. Decathlon.: No. 6307. BAVI
    - h. "Basic Grooming." Appaloosa Horse Club, Inc.
    - i. "Saddle Seat Equitation." American Horse Shows Association.
    - j. "Stock Seat Equitation." American Horse Shows Association.
    - k. "Hunt Seat Equitation." American Horse Shows Association.
    - l. "They're Off and Running." BAVI

F. Filmstrips
1. Basic Horsemanship Kit - 6 filmstrips
    "English Equitation"
    "The Western Equitation Class"
    "Care of the Brood Mare and Foal"
    "Grooming Your Horse"
    "Horse Safety"
    "Hoof Care"

Available from: Vocational Education Productions, California Polytechnical State University, San Luis Obispo, California. 93407

HUMAN RELATIONS (UNIT 1)

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Define Human Relations.
B. Evaluate his/her interests by completing an interest inventory.
C. Define the terms: interest, aptitude, and ability.
D. Differentiate between a mental aptitude and a physical aptitude.
E. Recall the three types of mental aptitudes.
F. Define the term personality.
G. List and discuss personality traits.
H. Know why personality traits are important for success on the job.
I. Design a program to improve your personality.
J. Distinguish between an optimist and a pessimist.
K. Evaluate your attitudes by completing an attitudinal inventory.
L. Identify and describe twelve qualities that women most admire in men.
M. Identify and describe twelve qualities that men most admire in women.
N. Judge when a person is most likely to be in a receptive mood, based on criteria discussed in class.

II. Concepts to Develop

A. A person's values significantly affect his/her performance on the job.
B. Personality traits directly affect a person's success on the job.
C. The possession of certain characteristics play a vital role in a person's acceptance by the opposite sex.

III. Subject Matter to Teach

A. Values and their affect on our lives and jobs.
B. Personal traits and their influence on job performance.
    1. Interest.
    2. Mental aptitude.
    3. Physical aptitude.
C. Examining Six Factors in Personality
    1. The Way You Look
        a. Self-Analysis
    2. The Way You Talk
        a. Voice and Speech
    3. The Way You Listen
        a. Using the Telephone effectively
        b. Have a "smile" in your voice
    4. The Way You Act Physically
    5. The Way You Act Emotionally
    6. The Way You Live (your philosophy of life)
D. Personality and its affect on our lives and jobs.
    1. Traits
        a. Attitude
        b. Courtesy
        c. Dependability
        d. Desire to succeed
        e. Enthusiasm
        f. Foresight
        g. Friendliness
        h. Health
        i. Honesty
        j. Initiative
        k. Loyalty
        l. Morality
        m. Neatness
        n. Open mindedness
        o. Personal appearance
        p. Punctuality
        q. Sense of humor
        r. Self control
        s. Tact
        t. Use of voice
    2. Ways of improving your personality.
        a. Treat people as individuals
        b. Recognize that human behavior is unpredictable
        c. Don't pass the buck
        d. Be loyal to others
        e. Seek raises and promotions on merit
        f. Compliment fellow workers
        g. look sharp
        h. Plan ahead
        i. Be friendly
        j. Don't be afraid to ask questions
        k. Approach your job with enthusiasm
        l. Don't join cliques

IV. Motivation

A. Films, slides and filmstrips.
B. Resource persons speak to class.
C. Field trips to agribusiness firms.
D. Former students report their expriences obtained in the world of work.

V. Learning Activities

A. Complete an aptitude inventory.
B. Complete an interest inventory.
C. Complete a checklist personality inventory.

D. Participate in interviews with a personnel manager, union steward, union official, supervisors, etc.
E. Occupational experience programs.
F. Crosswork puzzle
G. Worksheets
H. Quizzes
I. Exam
J. Rating One's Personality Sheet

HUMAN RELATIONS (UNIT 2)

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. List five employment qualifications.
B. Discuss the qualifications needed for entry into a job cluster.
C. Compare his/her employment qualifications with the qualifications needed for five occupations.
D. List twelve different sources of job opportunities.
E. Identify three benefits one may receive from part-time employment.
F. List and discuss the eleven points emphasized in *Succeeding in the World of Work* for filling out application forms.
G. Fill out job application forms.
H. Construct a letter of application for a job.
I. Be familiar with the components of a personal data sheet.
J. Develop your own personal data sheet.
K. Present orally the purposes of an interview and how you prepare for an interview.
L. Conduct an interview.
M. Present a speech.
N. Make introductions

II. Concepts to Develop

A. Personal qualifications and interests should be matched with the career opportunities being sought.
B. Part-time employment is an asset when seeking full or future employment.
C. A properly written letter of application contributes to a person's success in the job market.
D. Certain skills are needed if one is to participate in a successful interview.
E. Prepare a job reference sheet

III. Subject Matter to Teach

A. Matching a person's employment qualifications with career requirements
  1. A person's first job.
  2. Job families.
  3. Comparison of careers.
B. Locating a job
  1. Sources of job opportunities and the value of each one.
C. Part-time employment and its relationship to future employment.
  1. Value of part-time work when seeking full-time employment.
  2. Value of "test-out" and transition from school to work.
D. Application forms
  1. Characteristics of properly completed forms.
E. Personal data sheets
  1. Components of the resume
F. Process of interviewing for a job
  1. Items which a person should take to the interview.
  2. Personal appearance.
  3. Knowledge of the company — or business-interviewee.
  4. Reasons why you are interested in working for the company which is conducting the interview.
  5. Personal preparation for anticipated questions.
  6. Reasons why some persons fail to favorably impress an interviewer.

IV. Motivation

A. Films, slides,and filmstrips.
B. Guest speakers.
C. Field trips to agribusiness firms.
D. Former students report on experiences from the world of work.

V. Learning Activities

A. Fill out job applications.
B. Write letters of application and submit to the instructor for evaluation.
C. Fill out a personal data sheet.
D. Crossword Puzzle
E. Worksheets
F. Quizzes
G. Exam

HUMAN RELATIONS (UNIT 3)

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. List and discuss eight attitudes which an employer desires in his employees and six attitudes an employee desires in his employer.
B. Describe attitudes employers do *not* desire in their employee and four attitudes employees do *not* desire in their employers.

C. Describe the abilities, skills, and attitudes necessary for employment in a job of your choice.

D. Discuss at least three factors which are necessary for good relationships among co-workers.

E. Identify the major causes of a given co-worker relationship problem and be able to suggest possible solutions.

F. Describe how unions and professional organizations are organized and how they function.

G. List and discuss what you believe are five advantages and five disadvantages of unions and professional organizations.

H. Select the better qualified of two individuals for a given job when given a set of criteria.

I. Develop a set of criteria an employer could use for promoting an employee.

J. List and explain the duties and responsibilities of a job supervisor.

K. Describe the various methods of terminating a job.

II. Concepts to Develop

A. Good rapport with one's fellow workers contributes to production efficiency.

B. Attitudes play an important role in employee-employer relationships.

C. Affiliation with a union or a professional organization affords its membership with numerous benefits.

III. Subject Matter to Teach

A. Attitude expectations of employers and employees.
  1. Define
    a. Employer.
    b. Employee.
    c. Persistence.
    d. Enthusiasm.
  2. Factors relating to success on the job.
  3. Positive attitudes exhibited by employees.
  4. Negative attitudes exhibited by employees.
  5. Favorable and unfavorable attitudes possessed by employers as viewed by employees.

B. Importance of getting along with co-workers to maximize production efficiency.
  1. Factors which promote good relationships
    a. Respect for authority
    b. Cooperation
    c. Honesty
    d. Responsibility
    e. Loyalty
    f. Be interested in others
    g. Understanding relationships of customers
    h. Be cheerful

C. Influence of unions and professional people on an individual's employment status.
  1. Define
    a. Foreman.
    b. Collective bargaining.
    c. Negotiations.
    d. Job security.
    e. Unemployment compensation.
    f. Picket line.
    g. Mediation.
    h. Apprenticeship.
  2. Advantages and disadvantages of union membership.

IV. Motivation

A. Films, filmstrips, and slides.
B. Guest speakers.
C. Field trips to agribusiness firms.
D. Former students report experiences from the world of work.

V. Learning Activities

A. Review union and professional organization literature to determine its organizational structure.
B. Compile a list of union and professional organizations available to employees in the area.
C. Look at studies to become familiar with duties and responsibilities of supervisors.
D. Write letters of resignation and submit to the instructor for his/her evaluation.
E. Crossword Puzzle
F. Worksheets
G. Quizzes
H. Unit Exam

VI. Materials Needed

A. Books
  1. Binkley. *Course of Study in Non-Farm Agricultural Occupations.* University of Kentucky, Lexington. 1965.
  2. Brogden. *Developing Communication Skills in Non-Committed Learners.* Parker Publishing Company, West Nyack, New York. 1970.
  3. *Dictionary of Occupational Titles Volume I and II.* Department of Labor. Current Edition.
  4. *Four Methods of Doing Business-Instructor's Guide.* Farmers Regional Cooperatives, Fort Dodge, Iowa. 1968.

5. Goldstein & Stark, *Entering the Labor Force.* Holt, Rinehart, and Winston, Inc. 1964.
6. Hemp & Krebs. *A Study Guide for Placement—Employment Programs in Agricultural Business and Industry.* Interstate.
7. Hopke. *Encyclopedia of Careers and Vocational Guidance.* Volume I and II. Doubleday.
8. Humphry. *Essential Aspects of Career Planning and Development.* Interstate.
9. Joseph. *Career Outdoors.* Thomas Nelson and Sons, Camden, New Jersey.
10. Kimbrell & Vineyard. *Succeeding in the World of Work.* McKnight and McKnight Publishing Company. 1970.
11. Mager. *Preparing Instruction Objectives.* Fearon Publishers.
12. Mager & Beach. *Developing Vocational Instruction.* Fearon Publishers.
13. Rathos, Harmon & Simon. *Values and Teaching: Working With Values in the Classroom.* Merrill Publishing, 1966.
14. Roy. *Exploring Agribusiness.* Interstate. 1975
15. Stone. *Careers in Agribusiness and Industry.* Interstate.
16. Strong. *Industrial Labor and Community Relations.* Delmar Publishers, Albany, New York. 1974.

B. Pamphlets

1. Belman. "My Career Guidebook." Bruce Publishing Co. 1967.
2. Clark & McCarley. "A Pattern for Individualized Instruction in Vocational Agricultural Classes." Michigan State University, East Lansing, Michigan, 1968.
3. Dreese. "How to Fit the Job." Science Research Associates. Chicago, Illinois. 1960.
4. "An Employer's Guide to On-the-Job Training Under the Manpower Development and Training Act." U.S. Government Printing Office. Washington, D.C. 1966.
5. Fleming. "Your Days of Decision: What Do You Want To Do With Your Life?" National Farmer's Union, Denver, Colorado. 1964.
6. ______Your World of Work: "How to Find Your Way In It." National Farmer's Union, 1965.
7.
8. Hemp & Williams. "Research Related to the Disadvantaged and Research Strategies for the Seventies." University of Illinois-Urbana. July 1969.
9. Hudson & Weaver. "Succeeding At Work: Section 3: Learning More About Your Job." United Transparencies Inc. Binghamton, New York.
10. Hudson & Weaver. "Succeeding At Work: Section 4: Following Rules."
11. ______"Succeeding At Work:" Section 5: Keeping Safe At Work. United Transparencies.
12. ______"Succeeding At Work: Section 6: Keeping Healthy At Work." United Transparencies.
13. ______"Succeeding At Work: Section 7: Taking a Vacation." United Transparencies.
14. "Human Relations in Agricultural Occupations." Ohio State University. Columbus, Ohio. 1965.
15. "Introducing Agricultural Career Experience." Kansas State University, Manhattan, Kansas. 1969.
16. Jaworski, et al. "Careers in Agriculture." Wisconsin Department of Public Instruction. 125 S. Webster St., Madison, Wisconsin.
17. Kissinger & Drier. "Teacher's Guide: Vocational Guidance." Wisconsin Deparment of Public Instruction.
18. Menninger. "Growing Up Emotionally." Science Research Associates. Chicago, Illinois.
19. Moyniham, Daeger & Giles. "You and Your Job: A Guide for Instructors." Ferguson Publishing Company. Chicago, Illinois.
20. "Occupational Education in Agriculture High School." North Carolina Department of Public Instruction. Raleigh, North Carolina. 1969.
21. Rath. "Applying For A Job." Interstate.
22. Rath. "Succeeding on the Job." Interstate
23. Sinick. "Your Personality and Your Job." Science Research Associates. Chicago, Illinois.
24. Stone. "How To Choose Your Work." Bruce Publishing Company. 1969.
25. ______"How To Get A Job." Bruce Publishing Company.

26. Turner. "Changing a Job." Follett Educational Corp. Chicago, Illinois.
27. ______"The Family You Belong To." Follett Educational Corp.
28. ______"The Friends You Make." Follett Publishing Company. 1962.
29. ______"Holding A Job." Follett Educational Corp.
30. ______"The Jobs You Get." Follett Publishing Company.
31. ______"The Language You Speak." Follett Publishing Company. 1965.
32. ______"The Letters You Write." Follett Publishing Company. 1966.
33. ______"Looking For a Job." Follett Publishing Company. 1967.
34. ______"The Phone Calls You Make." Follett Publishing Company. 1966.
35. ______"Starting A Job." Follett Publishing Company. 1967.
36. ______"The Town You Live In." Follett Publishing Company. 1962.
37. ______"Training for a Job." Follett Publishing Company. 1967
38. ______"Wanting a Job." Follett Education Corporation. 1967.
39. "You and Your Job: How to Get It." Milwaukee Vocational Technical and Adult Schools. 1967.

C. Transparencies
1. "Succeeding At Work." United Transparencies, Binghamton, New York.
2. "I Want A Job." United Transparancies.

D. Films
1. "Preparing For the World of Work." BW Film, Guidance Associates, Pleasantville, New York.
2. "Where The Action Is." Instructional Media Center, Visual Instruction Bureau, Division of Extension, Drawer W, The University of Texas, Austin, Texas.
3. "Good Feelings" Modern Talking Picture Service, 1687 Elmhurst Rd., Elk Grove Village, Ill., 60007
4. "It's Up To You" Modern Talking Picture Service, 1687 Elmhurst Rd., Elk Grove Village, Ill., 60007
5. "Belonging To The Group" Modern Talking Picture Service, 1687 Elmhurst Rd., Elk Grove Village, Ill., 60007
6. "Courtesy At School" Bureau of Audio Visual Instruction, 1327 University Avenue, Madison, Wisconsin, 53706
7. "Let's Have Respect" Bureau of Audio Visual Instruction, 1327 University Avenue, Madison, Wisconsin, 53706
8. "Working With Others" Bureau of Audio Visual Instruction, 1327 University Avenue, Madison, Wisconsin, 53706
9. "Learning About Human Behavior"
10. "Pride and Principle"
11. "Your Self-Image"
12. "Sense of Purpose"
13. Human Relations Section
Film Catalogue
Audio Visual Services, Kent State University, Kent, Ohio, 44242
14. Human Relations Section
Audio Visual Center
Indiana University
Bloomington, Indiana, 47401

E. *Filmstrips*
1. The following are available from:
Guidance Associates, Pleasantville, New York 10570
"A Job That Goes Someplace"
"An Overview of Technical Education"
"Choosing a College"
"Choosing Your Career"
"Dropping Out - The Road to Nowhere"
"Exploring Moral Values"
"Four Who Quit"
"Getting & Keeping Your First Job"
"Jobs For High School Students"
"Liking Your Job and Your Life"
"Preparing for the Jobs of the 70's"
"Preparing for the World of Work"
"Reflections of Myself: The Adolescent Experience"
"Somebody's Cheating"
"Teen Age Rebellion: Challenge to Authority"
"The Role of the Counselor in the Secondary School"
"Think of Others First"
"Trouble At Work"
"Understanding Your Parents"
"Values for Teenagers — The Choice is Yours"
"Why Work at All"
"You and the Law"
"Your First Week on the Job"
"Your Job Interview"

2. The following are available from:
Popular Science Publishing Co.
Audio-isual Division, 355 Lexington Avenue, New York, New York 10017

"Job Finding II"
Civil Service Jobs
Skills That Pay Off
What Vocational Studies Can Do For You
"Personality Development"
Facing Disappointments
Making Decisions
Taking Criticism
Taking on Responsibility
To Be Somebody
Turning Over A New Leaf
"Career Opportunities I"
Career Planning in a Changing World
How to Study Occupations
Interests Pay Off
New Career Opportunities
Your Life at Work
"Career Opportunities II"
Careers in Science
Jobs in Mathematics
Salaried Worker or Self-employed
"Personal Problems"
Anxiety
Everyone Makes Mistakes
Frustrations
Personal Problem Solving
The Fight Against Fear
Status Seeking
"Knowing Yourself"
Needs, Satisfactions, Goals
On Being Different
So You Are Not Like Everybody Else?"
Understanding Myself
Who Do You Want to Be?
Your Search for Self
"Getting Along in School II"
The Ins and Outs
Your Occupations - Student
"Family Living I"
Getting Along With Your Brothers and Sisters
Getting Along With Your Family
Is there a Typical Family?
Parents are People Too

3. "Human Relations in Agribusiness"
NASCO
901 Janesville Ave.
Fort Atkinson, Wis. 53538

F. Videotapes
The following are available from: Wisconsin Department of Public Instruction, 125 S. Webster Street, Madison, Wisconsin 53702

Lessons	10	Exploring Paper Industry Occupations
	12	Exploring Machine Trade Occupations
	13	Exploring Office Occupations
	14	Exploring Marine Construction Occupations
	15	Exploring Health Occupations
	16	Exploring Public Utility Occupations
	17	Exploring Telephone Company Occupations
	18	Exploring Transportation Occupations
	19	Exploring Radio & Television
	20	Exploring Building Trades Occupations
	21	Exploring Petroleum Industry Occupations
	22	Exploring Conservation and Recreation Occupations
	23	Exploring Leather Goods Occupations
	24	Exploring Agricultural Occupations

HYDRAULICS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in agricultural hydraulics and will be able to relate these factors to his/her own specific needs and aspirations.

B. Contrast various job opportunities in agricultural hydraulics regarding fringe benefits, retirement, vacation, promotion possibilities, and working conditions.

C. Explain the principles involved in hydrodynamics and hydrostatics.

D. Demonstrate and explain the relationship between pressure, velocity, flow and power in a hydraulic system.
E. Identify the basic components and indicate the primary function of a simple hydraulic circuit.
F. Calculate the recommended reservoir capacity of a system.
G. Demonstrate the principle of a heat exchange as used in mobile hydraulic equipment.
H. Identify and discuss the characteristics and usage of hydraulic hose, tubing and piping.
I. Explain the main differences between positive and non-positive displacement.
J. Identify each of the three types of fixed displacement pumps, and explain the characteristics of each.
K. Sketch and explain the operational principles of a variable displacement unbalanced vane pump, a variable displacement piston type pump, and an internal and external gear type pump.
L. Identify and discuss the purpose of pressure, directional, and control valves.
M. Trace the flow path of fluid through a direct acting relief valve, a pilot operated relief valve, a pressure sequence valve, and an unloading valve.
N. Trace the oil path in a hydraulic circuit operating a double acting cylinder and controlled by a two position, four connection valve.
O. Identify and properly name the 6 most commonly used valves on agricultural equipment.
P. Identify and discuss the function of each part of piston and vane type cylinders, the advantages and disadvantages of hydraulic motors, the types and uses of accumulators in mobile hydraulic systems.
Q. Explain the functions and properties of hydraulic fluids.
R. Discuss and identify fluid contaminants and the methods of removal.
S. Describe and apply procedures of maintenance as it relates to the use of fluid lines, couplings and seals.

II. Concepts to Develop

A. There are career opportunities in the field of hydraulics for young men and women at all levels of education preparation.
B. The development and trends in the use of hydraulics in the agricultural industry has greatly increased in recent years.
C. To properly understand the principles and uses of hydraulics one must become familiar with the science of liquids under pressure and energy transfer (Pascal's Law).
D. Each basic component in the hydraulic system has a specific function.
E. There is a positive relationship between pressure and flow in a hydraulic system.
F. Mobile hydraulic equipment requires several types of basic components.
G. Hydraulic fluids have specific properties.
H. Contaminants increase wear and reduce the efficiency of the hydraulic system.
I. Regular maintenance procedures relating to fluid lines, couplings and seals is essential if trouble free operation is to be realized.
J. Correct trouble shooting procedure results in early detection of the problem and its solution.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs.
    2. Job description.
    3. Training requirements.
    4. Working conditions.
    5. Opportunity for advancement.
    6. Other factors relating to student needs and aspirations.
B. Hydraulic principles
    1. Relationship of pressure and flow
    2. Transfer of energy.
    3. Methods of measuring pressure and vacuum.
    4. Determining the force, power and horsepower.
    5. Parallel and series circuits.
C. Components of a hydraulic circuit
    1. Function of each basic component: pump, actuator, valve, reservoir, hoses and tubing.
    2. Location of each component in a circuit.
D. Principles of pump operation
    1. Types of pumps in common use.
    2. Pump classification.
    3. Pressure, flow and displacement rating.
    4. Determine volumetric efficiency of pumps.
    5. Advantages and disadvantages of commonly used pumps.
E. Principles of valve operation
    1. Pressure, directional and flow control valves.

    2. Operating principle of each of the commonly used valves.
- F. Actuator operation
    1. Major types of cylinders.
    2. Advantages and disadvantages of hydraulic motors.
    3. Function of accumulators.
- G. Fluids, filters and strainers.
    1. Hydraulic fluid recommendations.
    2. Filter and strainer requirements.
- H. Fluid lines, couplings and seals
    1. Sizing tubing and couplings to a hydraulic system.
    2. Hose vs. tubing or pipe.
    3. Maintenance recommendations.
- I. Trouble shooting
    1. Procedure for checking efficiency of all major components in a hydraulic circuit.

IV. Motivation

- A. Field trips to implement dealers, industry, farm or logging operations where hydraulic equipment is being used or repaired.
- B. Films, filmstrips and slides.
- C. Class presentation by an implement dealer or mechanic.
- D. Bulletin board displays.

V. Learning Activities

- A. Occupational experience programs.
- B. With use of hydraulic workbooks, work out a series of experiments on hydraulic test benches.
- C. Collect samples of all basic components for individual and group study.
- D. Construct a simulated heat exchanger and demonstrate its operation.
- E. Disassemble a cylinder and check override and cushioning devices.
- F. Check operation of hydraulic equipment on home farm. Report to class.
- G. Determine cost of replacing a pump on a farm tractor.
- H. Sketch a simple circuit and trace fluid flow in all control valve positions.
- I. Set up a hydraulic circuit on the test benches and determine the pressure, flow and horsepower developed.
- J. With use of a hydraulic tester, determine the efficiency of a tractor's hydraulic system.

VI. Materials Needed

- A. Books:
    1. Basic Hydraulic Principles & Trouble Shooting Suggestions - Owatonna Tool Co., Owatonna, Minn.
    2. Basic Hydraulics Workbook, Daines - Technical Systems Inc. 1970
    3. Fluid Power - Bureau of Naval Personnel - U.S. Navy Training Publications Center - Memphis, Tenn. 1966
    4. Fundamentals of Service - Hydraulics - Deere & Co. Moline, Ill. 1972
    5. Hydraulics & Pneumatics - 614 Superior Ave., West - Cleveland, Ohio 44113
    6. Hydraulic Power Transmission - American Oil Co., 910 South Michigan Ave., Chicago, Illinois 60680
    7. I & T Shop Service - Technical Publications Inc., 1014 Wyandotte St., Kansas City, Mo. 64105
    8. Implement & Tractor - Intertec Publishing Corp., 1014 Wyandotte St., Kansas City, Mo. 64105
    9. Mobile Hydraulic Destiny - Glenn & Blinn - American Technical Society, Chicago, Illinois
    10. Mobile Hydraulics Manual - Basal - Sperry Rand Corporation, Troy, Michigan 48084
    11. Practical Hydraulics - Atland - Vickers Division of Sperry Rand, Troy, Michigan 48084
- B. Bulletins and Pamphlets
    1. "A Course Outline for an Introduction to Fluid Power." National Fluid Power Association, Thiensville, Wisconsin.
    2. "Hydraulics for Tractors and Other Mobile Equipment - Volume I Care and Operation." AAVIM - Athens, Georgia
    3. "Hydraulics for Tractors and Other Mobile Equipment - Volume II Inspecting and Testing." AAVIM - Athens, Georgia
    4. "Hydraulic Power Transfer Systems." Ohio State University, 980 Kinnear Road, Columbus, Ohio 43212, 1965
    5. "I and T Shop Service." Technical Publications Inc. 1014 Wyandotte Street, Kansas City, Mo. 64105, 1966
    6. "Vocational Education and Occupation Handbook." Superintendent of Documents Catalogue No. FS 5.280:80061. U.S. Government Printing Office, Washington, D. C.

C. Films
   1. "Application of Pascal's Law Part I." United World Films, Government Films Department, 1445 Park Ave.. New York, NY.
   2. "Application of Pascal's Law Part II." United World Films.
   3. "Basic Principles of Hydraulics" Jam Handy Organization, 2821 S. Grand Blvd., Detroit 12, Michigan.
   4. "Controlled Power." Sperry Rand Corporation. Troy, Michigan.

Filmstrips
   1. "Hydraulic Cylinders." Visual Education, Inc. Southern Building, 1425 H. Street, N.W. Washington, D.C. 20005
   2. "Hydraulic Pumps." Visual Education Inc.
   3. "Hydraulic Valves." Visual Education, Inc.

Slides
   1. "Applied Hydraulics." Visual Education Inc.
   2. "Basic Hydraulics." Visual Education Inc.
   3. "FOS-10 Hydraulics" John Deere Company
   4. "Hydraulic System for Grain Harvesting." Visual Education Inc.

D. Laboratory Manuals
   1. Daines. *Basic Hydraulics Workbook*, Technical Systems, Inc. 1970 (To be used with Technical Systems Hydraulic Test Benches.)

E. Periodicals
   1. *Hydraulics and Pneumatics.* 614 Superior Ave. West Cleveland, Ohio.
   2. *Implement and Tractor.* Intertec Publishing Corp. 1014 Wyandotte Street, Kansas City, Missouri, 64105

F. Equipment
   1. Hydraulic Test Bench. Technical Systems Inc., 715 Raymond, St. Paul, Minnesota 55114.

"INTRODUCTION TO AGRICULTURE"

(A Suggested 9-Week Course of Study for 8th Grade Students)

I. American Agriculture

A. Agriculture-America's No. 1 Industry
   1. Why is the study of agriculture important to all of us?
   2. What are the types of farming in the United States?
   3. How is agriculture changing?
   4. What is necessary for success in farming?

B. The Good Life - Rural America
   1. Who lives in rural America?
   2. How good is "The Good Life"?
   3. What organizations do rural people belong to?
   4. What role does government play in American Agriculture?
   5. How can (or how has) life in rural America be improved?

C. Young People in Agriculture
   1. What do young people want and need?
   2. What organizations are available to young people interested in agriculture?
   3. What does the future hold for young people?

D. Choosing A Career in Agriculture
   1. How are agricultural occupations classified?
   2. What do you need to know about a career before making a choice?
   3. How do people get started in agricultural careers?
   4. Examples of successful career people in agriculture

E. The Importance of Farm Animals in Our Lives
   1. What do we get from farm animals?
   2. What are the classes of farm animals?
   3. What are the important differences among the classes of farm animals?
   4. What are the principal breeds of:
      a. Dairy Cattle
      b. Beef Cattle
      c. Hogs
      d. Sheep
      e. Horses
      f. Poultry

References: Krebs, Alfred H., Agriculture In Our Lives, The Interstate Printers & Publishers, Inc., Danville, Ill., C 1973, 3rd Edition, Chapters 1-4, 9.

2 wks.

II. Wisconsin Agriculture

A. How important is Agriculture to Wisconsin?
   1. Number, size, and value of farms - State and County
   2. Farm income - State and County
   3. Wisconsin's rank in American agriculture

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B. Crop Production in Wisconsin
  1. Acreage, yield, and total production - State and County, of:
    a. Corn for grain
    b. Corn for silage
    c. Oats
    d. Barley
    e. Wheat
    f. Soybeans
    g. Hay Crops
    h. Specialty Crops
    i. Canning Crops

C. Livestock Production in Wisconsin
  1. Total cattle numbers and production - State and County
  2. Beef cattle numbers - State and County
  3. Swine production - State and County
  4. Sheep production - State and County
  5. Poultry production - State and County

D. Dairy Cattle
  1. Numbers and production - State and County
  2. Production and consumption of dairy products

Reference: Wisconsin Statistical Reporting Service, 1978 Wisconsin Agricultural Statistics, Wisconsin Department of Agriculture, Trade, and Consumer Protection, Madison, Wisconsin.

1½ wks.

III. You and the FFA

A. What will you do as an FFA member?
B. How can the FFA help you get started in a career?
C. Just what is the FFA, and how did it get started?
D. What are the aims and purposes of the FFA?
E. What is a Supervised Occupational Experience Program?

Reference: Production Credit Associations of the U.S., Student Handbook, National FFA Supply Service, Alexandria, Va., C1977, Chapters I and II.

½ wk.

IV. The Vocational Agriculture Curriculum

A. An overview of the curriculum
B. Detailed description of each course including requirements and prerequisites.

LANDSCAPING

I. Performance Objectives

Upon completion of this unit, the student will be able to:

A. Be familiar with current employment information such as job description, job availability, personal training, requirements, working conditions, opportunities for advancement and other factors relating to potential employment in landscape design and maintenance and will be able to relate these factors to his/her own specific aspirations.
B. Be able to go through the steps of creative thinking about landscape design.
C. Be able to properly do a site analysis.
D. Use the proper graphics for all of the elements of a landscape design.
E. Fill out a family inventory checklist.
F. Be able to do a rough design of an area using an overlay and doing goose egg planning, lay out traffic patterns and chart the climatic factors of the site.
G. Properly do a complete landscape layout.
H. Be able to read a landscape design.
I. Determine the cost of establishing your landscape that you designed.
J. Become familiar with the various landscape structures.
K. Become familiar with the various landscape construction material.
L. Be able to explain the principles of landscape design in terms of landscape structures, materials and plants.
M. Explain how to use shrubs in the landscape.
N. Explain how to use trees in the landscape.
O. Explain how to use ground covers and vines in the landscape.
P. Explain how to use flowers in the landscape.
Q. Identify some of the following plant material, being able to explain where the plants would be used in a landscape design. (the following list is only a partial list)

Needled evergreen trees

Pines: Red, White, Austrian, Scotch, Muhgo, White Fir
Spruces: Blue, *Balsam, Black Hills*

Needled evergreen shrubs

Yews, Spreading, Cone Shaped, Hicks, Browni, Dwarf
Junipers: Blue Rug, Bar Harbor, Andorra, Hughes, Mint Julip, Iowa, Pfister, Hetz, Tamarix
Arborvitae: Techny, Globe, Bakers

Deciduous trees

Maples: Red, Sugar, Norway, Schwedler, Crimson King
Oaks: Red, Pin, White
Lindens: American, Little Leaf, Greenspire, Redmond
Ash: Green, White, Marshall Seedless.
Locusts: Skyline, Shademaster, Sunburst
Birches: Paper, Weeping, River
Russian Olive
European Mountain Ash
Flowering Crabs
Ginkgo
Saucer Magnolia
Tree Lilac
Smoke tree
Red Bud
American Sycamore
Hawthorn

Deciduous shrubs

Dogwoods: Red Twig, Yellow Twig, Gray
Spireas: Gold Flame, Anthony Waterer, Snow Mound
Viburnums: Cranberry, Leather Leaf, Doublefile, Arrowood, Snow Ball, Nanneyberry, Dwarf Cranberry
Barberrys: Green, Red, Rose Pink, Dwarf
Cotoneasters: Cranberry, Spreading, Peking
Mockorange: Minnesota Snowflake, Golden
Burning Bush
Alpine Currant
Potentilla
Privets: Amur River, Regal's
Fragrant Sumac
Lilacs: Common Purple, French
Snowberry
Indian River Coralberry
Honeysuckle: Tatarian, Clavey's Dwarf
Flowering Almond
Juneberry
Forsythia
Deutzia

Vines

Boston Ivy
English Ivy
Bittersweet

Ground covers

Junipers
Pachysandra
Ajuga
Wintercreeper
Periwinkle, Sedum

Flowers

Ageratum
Alysum
Celosia
Dianthus
Dusty Miller
Geranium
Begonia
Balsam
Coleus
Candytuff
Marigold
Petunia
Impatiens
Salvia
Zinnia
Snap Dragons

Tender Bulbs, Corms, rhizoms, etc.

Dahlia
Glads
Tuborous Begonia
Caladium

Perennials

Hostas
Tulips
Daffodils
Day Lily
Tiger Lily
Alyssum
Poppy
Iris
Crocus
Larkspur
Carnations
Phlox
Silver Mound
Violets
Bishops Weed
Lily of the Valley
Fox Glove
Silver King
Mums
Sedums
Snow on the Mountain

R. Establish bare root, balled and burlapped and container grown plant material
S. Stake a tree using 2 different methods
T. Explain and perform the proper methods of fertilizing trees and shrubs
U. Properly wrap a tree
V. Explain the advantages and disadvantages of the different types of material used for mulching.
W. Perform in the field the pruning techniques of the different types of plant material.
X. Explain the different methods of controling weeds in the landscape.
Y. Demonstrate the different methods of winter protection of the plant material in a landscape.

II. Concepts to Teach

A. There are career opportunities for men and women in the different areas of landscaping, at all levels of educational preparation.
B. Landscape design is a form of creative thinking.
C. Site analysis is one of the first steps in starting a design.
D. The family inventory checklist should include all of the things that will be included and excluded from the design.
E. In design there are basic principles that should be followed.
F. Before the final design is to be put on paper, overlays should be used to get a better feel of the area being used.
G. A good design consists of various types of landscape structures and materials that are functional in the design.

H. Every plant has individual qualities and environmental needs.

I. Each plant that is used in a design should be a functional part or part of a functional unit of the design,

J. Flowers can play an important role in the design of an area.

K. There are three basic areas of a house and lot to be landscaped, they are the public, private and service areas. Each one has specific elements that should be included in the design of the area.

L. When putting the final design on paper, the graphics and lettering should be uniform and neat so that the design can be easily read.

M. Nursery plant material can be purchased in three different forms, each one having its own advantages and disadvantages to the landscaper.

N. To properly establish a landscape requires many skills such as, redesign and interpreting a design, transplanting, pruning etc.

O. A properly maintained landscape requires many skills such as, pruning, insect control, weed control, wrapping, etc.

III. Subject Matter to Teach

A. Careers
  1. Occupation or job titles
    a. Landscaper
    b. Landscape designer
    c. Landscape Architect
    d. Grounds Maintenance
  2. Type and level of education required
  3. Working conditions
  4. Personal qualifications needed
  5. Employment opportunities
  6. Scope of landscape industry local - state - national

B. Introduction to landscape design
  1. History
  2. Why landscape
  3. Shot gun landscaping
  4. Creative thinking

C. Site analysis
  1. Environmental factors
  2. Views
  3. Drainage
  4. Existing plants
  5. Existing natural resources
  6. Existing structures
  7. Soil
  8. Local ordinances

D. Graphics
  1. Construction material
  2. Trees
    a. Evergreen
    b. Deciduous
  3. Shrubs
    a. Evergreen
    b. Deciduous
  4. Ground Covers
  5. Vines
  6. Flower beds
  7. Other landscape symbols
  8. Lettering
  9. Plant chart

E. Rough landscape design
  1. Overlays
  2. Goose egg planning
  3. Traffic patterns
  4. Environmental factors

F. Landscape layout
  1. Design tools
  2. Proper layout

G. Landscape structures
  1. Patio
  2. Decks
  3. Enclosure structures
  4. Surfaced areas
  5. Retaining walls
  6. Garden embellishments
  7. Irrigation systems
  8. Pools
  9. Etc.

H. Landscape construction material
  1. Different types of wood
  2. Rock
  3. Soil
  4. Blocks
  5. Other

I. Design principals
  1. Unity
  2. Simplicity
  3. Balance
  4. Emphasis
  5. Sequence
  6. Scale
  7. Variety

J. Factors that determine which plants to use for your design
  1. Soil
  2. Hardiness zone
  3. Form
  4. Function
  5. Size
  6. Texture
  7. Color

K. Uses of shrubs in the design
  1. Accent plants
  2. Specimen plants
  3.Screens
  4. Foundation plantings
  5. Mass plantings
  6. Group plantings
  7. Traffic control
  8. Shade
  9. Wind break

L. Uses of trees in the design
  1. Frame

- 2. Mask awkward architectural features
- 3. Background
- 4. Shade
- 5. Street trees
- 6. Wind breaks
- 7. Accent plant
- 8. Specimen plant

- M. Uses of ground covers in the design
  - 1. Erosion control
  - 2. Use instead of grass or mulch
  - 3. Add to the total design
- N. Uses of vines in the design
  - 1. Hide awkward architectural elements
  - 2. Ornamental
- O. Fitting flowers into the design
  - 1. Types
    - a. Annuals
    - b. Perennials
    - c. Bulbs
    - e. Biennials
    - f. Tender perennials
  - 2. Color schemes
  - 3. Flower borders
  - 4. Flower beds
  - 5. Cut flowers
- P. Designing the public area
  - 1. Elements
    - a. Trees
    - b. Shrubs
    - c. Lawns
    - d. Structures
  - 2. Entrance way plantings
  - 3. Foundation plantings
  - 4. Corner plantings
  - 5. Side plantings
  - 6. Porch plantings
- Q. Designing the living area
  - 1. Structures
    - a. Pools
    - b. Decks
    - c. Fences
    - d. Etc.
  - 2. Trees
  - 3. Shrubs
  - 4. Flower beds
- R. Designing the service area
  - 1. Structures
  - 2. Plantings
- S. Determining the cost of the design
  - 1. Cost of material
  - 2. Labor cost
- T. Establishing the landscape
  - 1. Planting
    - a. Bare root stock
    - b. Balled and burlapped
    - c. Container grown
  - 2. Staking
  - 3. Wrapping
  - 4. Mulching
  - 5. Fertilization
- U. Maintaining the landscape
  - 1. Pruning
  - 2. Fertilizing
  - 3. Mulching
  - 4. Weed control
  - 5. Watering
  - 6. Winter protection

IV. Motivation

- A. Films, filmstrips and slides about landscape design, establishment, and maintenance of plant material, careers, etc.
- B. Field trips to nurseries, landscape sites, parks, etc.
- C. Resource speakers from design firms, nurseries
- D. Bulletin boards on plant material, design elements, extension bulletins.
- E. Charts on plant height and spread
- F. Doing designs for different areas

V. Learning Activities

- A. From an index of job titles, prepare a list of occupations in the landscape design, maintenance and establishment industries.
- B. Students interview people working in the landscape industry.
- C. Do a job survey in the student's area.
- D. Perform a site analysis.
- E. Use worksheets to practice the various graphics and forms of lettering that can be used when drawing up a landscape.
- F. Using overlays, draw out a goose egg plan, map out traffic patterns and climatic factors of a given area.
- G. Interview a person and fill out a family check list for their yard and house.
- H. Practice designing the different areas of a landscape for different house styles and yard sizes, such as: foundation plantings, mass shrub plantings, porch plantings, screens, etc.
- I. Using different references (magazines, books), make a list of your favorite landscape styles and types of various landscape structures (patios, decks, walks, etc.).
- J. Determine what hardiness zone your area is in.
- K. Determine the good and bad views of your house.
- L. Develop a list of various types of wood that can be used in landscape construction.
- M. Prepare a list of various types of material that can be used for walk ways.
- N. Collect specimens of different textures of plant material.
- O. Develop a list of the different forms that plant material comes in and give an example of a tree or shrub for each.

P. Prepare a list of different trees that can be used in landscape design. Include the following information about these trees: height, spread, showiness, etc.
Q. Check the local ordinances for the use of plant material in a planting.
R. Make a list of different shrubs that can be used in a landscape design. Include some of the following information in this list: height, spread, showiness, etc.
S. Design a bed of annual plants.
T. Design a bed of perennial plants.
U. Design the public area for different types of houses and sizes of yards.
V. Design the living area for different types of houses and sizes of yards.
W. Design the service area for different types of houses and sizes of yards.
X. Do a total landscape layout.
Y. Analyze a landscape design.
Z. Determine the cost of a landscape design.
AA. Plant a bare root plant.
BB. Plant a container grown plant.
CC. Plant a balled and burlapped plant.
DD. Develop a rationale for the uses and location of various species of trees, shrubs and flowers in the landscape design.
EE. Stake a newly planted tree.
FF. Wrap a tree with tree wrap.
GG. Fertilize a newly transplanted tree or shrub.
HH. Prune a: Shade tree, Fruit tree, Evergreen tree, Evergreen shrub, Deciduous shrub, Other.
II. Determine the amount of fertilizer needed for various types and sizes of trees.
JJ. Construct a form of winter protection.
KK. Spray the proper insecticide on the plant material.
LL. Use the proper herbicide to control the weeds in a landscape planting.
MM. Use a sod lifter to prepare a bed for planting.

VI. Materials Needed

A. Books (General Landscaping)
  1. Brooks. *The Small Garden Design.* Brantwood Publications
  2. Crocket. *Garden Construction and Landscape Gardening.* Time Life Books. 1971.
  3. Editors of Sunset Books. Lane Publishing Co.
    Building Barbecues
    Fences and Gates
    Garden and Patio Book
    Garden Pools, Fountains and Waterfalls
    Gardening in Containers
    Landscaping
    Patio Book
    Patio Roofs
    Swimming Pools
    Walks, Walls and Patio Roofs
  4. Grant. *Garden Design Illustrated.* Brantwood Publications
  5. Hoover. *Approved Practices in Beautifying the Home Gardens.* Interstate Printers and Publishers. 1968.
  6. Ingels. *Landscaping Principles and Practices.* Van Reinhold Co. 1978.
  7. Ireys. *How to Plant and Plan Your Landscape.* M. Barrows and Co., Inc. 1967.
  8. Kramer. *Gardening and Home Landscaping.* Arco Publishing Co. 1968.
  9. Ortho Book Staff. Chevron Chemical Co. 1977.
    Wood Projects for the Garden
    Garden Construction Know How
    Gardening With Color
    Container and Hanging Baskets

(Landscape Maintenance)
  1. Conover. *Grounds Maintenance Handbook.* Oxford University Press. 1958.
  2. Editors of Sunset Books. *Pruning Handbook.* Lane Publishing Co. 1971.
  3. Grounds. *The Complete Book of Pruning.* MacMillan Publishing Co. 1973.
  4. Pirone. *Tree Maintenance.* Oxford Press, Inc. 1972.
  5. Shurtleff. *How to Control Plant Diseases in the Home Garden.* Iowa University Press. 1966.
  6. Tatter. *Diseases of Shade Trees.* Brantwood Publications.
  7. Thompson. *Pruning Apple Trees.* Faber and Faber, 1966.
  8. Westcott. *The Gardners Bug Book.* Doubleday and Co. 1973.
  9. Wittrock. *The Pruning Handbook.* Rodale Press Inc. 1971.

(Landscape Plants)
  1. Bloom. *Conifers for Your Garden.* Charles Scribners and Sons. 1972.
  2. Crocket. Time Life Books. 1971.
    Annuals
    Roses
    Lawns and Ground Covers
    Bulbs
    Evergreens
    Perennials
    Flowering Shrubs
    Trees

3. Dirr. *Photographic Manual of Woody Landscape Plants.* Brantwood Publications. 1978.
4. Editors of Countryside Books. *Home Landscaping.* A. B. Morse Co. 1974.
5. Editors of Sunset Books. Lane Publishing Co.
   Annuals
   Bulbs
   Garden Trees
   Lawns and Ground Covers
6. Hay and Synge. *The Color Dictionary of Flowers and Plants, The Color Dictionary of Trees and Shrubs.* Crown Publishing Co. 1974.
7. Helmer and Threckeld. *Pictorial Manual of Woody Plants.* Brantwood Publications. 1978.
8. Ortho Books Staff. Chevron Chemical Co. 1977.
   All About Roses
   Gardening With Color
   The World of Trees
9. Robinett. Plant Form Studies: *The Design Characteristics of Plant Material.* American Printing and Publishing. 1967.
10. Foley. *Ground Covers for Easier Gardening.* Dover Publications Inc. 1972.
11. Smith. *Trees in a Winter Landscape.* Holt, Reinhardt and Wilson. 1969.
12. Staff of the L. H. Hortorium. *Hortus Third.* Brantwood Publications. 1977.
13. Symonds. *The Shrub Identification Book, The Tree Identification Book.* William Morrow and Co. 1963.
14. Vertrees. *Japanese* Maples. Brantwood Publications.
15. Wyman. MacMillin Publishing Co.
    Shrubs for the American Garden
    Trees for the American Garden
    Wymen's Gardening Encyclopedia

B. Bulleting and Pamphlets
(U. W. Madison Extension)

Over 70 bulletins on Landscape Design, maintenance, plants and establishment. For an up-to-date list, refer to current *List of Home Grounds and Gardening Publications.* Some selected titles are as follows:

Salt Injury to Landscape Plants. A2970.
A Guide to Selecting Landscape Plants. A2865
Landscape Plants that Attract Birds. G1609.
Street Trees for Wisconsin. A2014.
Trees for Shade and Beauty. AG117.
Selecting and Growing Shade Trees. AG205.
Growing Lilacs. AG199.
Trees and Shrub Fertilization. A2308.

C. Slides and Film Strips

1. California Polytechnical State College
   Elements of Pruning
   Controlling Pests on Ornamental Plants
2. Pennsylvania State College
   Commonly Used Trees, Shrubs, Vines and Ground Covers
3. Ohio State University Curriculum Materials
   Over 20 slide sets on landscape design, maintenance, establishment and plants. Send for current catalogue. Ohio Agriculture Education, Curriculum Materials Service, The Ohio State University Room 254, 2120 Fyffe Road, Columbus, Ohio, 43210.
   Some select tities:
   The Maples
   Viburnums
   Landscape Design
   Small Trees for the Landscape
   Narrow Leaf Evergreens for the Landscape
4. University of Illinois
   Over 40 titles on landscape design, maintenance, establishment and plant material. Send for current catalogue. Vocational Agriculture Service, College of Agriculture, University of Illinois, 434 Mumford Hall, Urbana, Illinois, 61801.
   Some select titles:
   Landscape Planning Plan Series:
     Split Level Homes
     Two Story Victorian Style Homes
     One Story Ranch Style Homes
     Two Story Cape Cod Homes
5. NASCO
   NASCO offers over 30 sets of slides, filmstrips and film loops on landscape design, maintenance, establishment and plant material. Check their current catalogue for a complete list. A few select titles:
   Deciduous Ornamental Shrubs of Northern U.S.A.
   Deciduous Shade and Ornamental Trees of Northern U.S.A.

Ornamental Evergreen Trees and Shrubs of Northern U.S.A.
Ornamental Vines of Northern U.S.A.
Ornamental Ground Covers of Northern U.S.A.
(All of the above slide sets were done by Dr. Hasselkus)

D. Laboratory Manuals
  1. California Polytechnical State College
     Landscape Design
     Landscape Construction
     Landscape Maintenance
  2. Pennsylvania State College
     Landscape Design
     Landscape Maintenance and Establisment
  3. Williams' *Nursery Crops and Landscape Design*. Interstate Printers and Publishers.

E. Subject Matter Units
  1. Berninger. *Annuals Illustrated*. NASCO
  2. Berninger. *Horticultural Concepts*. NASCO

LIVESTOCK PRODUCTION AND ARTIFICIAL INSEMINATION

I. Performance Objectives

Upon completion of the unit, the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in small animal management and care and will be able to relate these factors to his/her own specific needs and aspirations.
B. Summarize in writing the history of the artificial insemination industry.
C. Describe chronologically the hormone affect on the heat cycle of the cow.
D. Diagram and identify the reproductive tract of the female animal.
E. Describe chronologically the hormone affect on the development of the bull.
F. Diagram and identify the reproductive tract of the bull.
G. Describe the advantages of artificial insemination.
H. Discuss and understand the procedures of semen collection and quality control.
I. Be familiar with the diluting or extension and storage of semen.
J. List procedures for the artificial insemination of the female.
K. List and discuss reproductive diseases in the male and female.
L. Identification of all tools and equipment used in artificial insemination.

II. Concepts to Develop

A. There are career opportunities in the artificial insemination industry for young men and women of all levels of educational preparation.
B. Artificial insemination has had a significant impact on the quality of farm animals in the U.S.
C. The anatomy and the physiology of the male and female animal.
D. Hormonal systems of the male and female.
E. A sound heat detection and breeding program is necessary in order to capitalize on sound management.
F. A sound health and sanitation program is necessary
G. A knowledge of the history of artificial insemination.
H. The advantages of artificial insemination.

III. Subject Matter to Teach

A. Careers.
  1. Current and future employment needs.
  2. Job descriptions.
  3. Training requirement.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.

B. Early History of Artificial Insemination
  1. Arab chieftains using A.I. on horses 1300 A.D.
  2. First controlled A.I. experiments, L. Spallangani, 1780.
  3. Early work with mares, France, 1890
  4. Early work in Russia, 1909.
  5. Early work in Denmark.

C. Artificial insemination in the U.S., 1937.
  1. First association in United States, New Jersey, 1938.
  2. First association in Wisconsin, Rock County, 1939.

D. The Reproductive System of the Cow
  1. Introduction.
  2. Ovaries.
  3. Tubular Genitalia.

E. Estrus Cycle
  1. Introduction.

  2. Cyclic nature of female reproductive life.
  3. Hormones that regulate the estrus cycle.
  4. Periods of estrus cycles.
  5. Time sequences in the estrus cycle.
  6. Ovarian changes in estrus cycle.
  7. Tubular changes during the estrus cycle.

- F. Ovigenesis, Ovulation, and Fertilization.
  1. Introduction.
  2. Ovigenesis.
  3. The mature ovum.
  4. Ovulation.
  5. Transport of the ovum.
  6. Penetration of the spermatozoon into the ovum.
  7. Formation and fusion of pronuclei.
  8. In Vitro fertilization and parthenogenesis.
  9. Superovulation and ovum transfer.
  10. Sex determination.
  11. Multiple fertilizations.
- G. Gestation
  1. Introduction.
  2. Preparation of the reproductive tract for pregnancy.
  3. The period of the ovum.
  4. The period of the embryo.
  5. The period of the fetus.
  6. Changes in the uterus and its contents during pregnancy.
  7. The hormones in pregnancy.
  8. Changes in the mammary glands during pregnancy.
  9. Nutrient requirements of the cow during gestation.
  10. Diagnosis of pregnancy.
  11. Length of gestation in cattle.
- H. Parturition
  1. Introduction.
  2. Initiation of parturition.
  3. Signs of approaching parturition.
  4. Normal and abnormal presentation.
  5. Stages of parturition.
  6. Involution of the uterus.
  7. Change in the oxygen supply for the calf.
- I. The Reproductive Tract of the Bull
  1. Introduction.
  2. The scrotum.
  3. The testes.
  4. The excurrent ducts.
  5. The accessory sex organs.
  6. The penis.
  7. First appearance of the sexual function in the bull.
- J. Spermatogenesis, Migration, Maturation, and Ejaculation of Spermatozoa
  1. Introduction.
  2. Spermatocytogenesis.
  3. Spermiogenesis.
  4. The endocrine control of spermatogenesis.
  5. Time required for the steps in spermatozoa formation.
  6. Passage of spermatozoa through the excurrent ducts.
  7. Function of the Epididymis.
  8. Ejaculation.
  9. Fate of unejaculated spermatozoa.
- K. Semen and Its Components
  1. Introduction.
  2. Contribution of the various parts of the reproductive tract to semen.
  3. Properties of ejaculated bull semen.
  4. The inorganic constituents of bull semen.
  5. The organic constituents of bull semen.
  6. Composition of the sperm cell.
- L. Morphology and Motility of Spermatozoa
  1. Introduction.
  2. Morphology of spermatozoa
  3. Motility of spermatozoa
- M. Metabolism of Bull Spermatozoa
  1. Introduction.
  2. Glycolysis.
  3. Respiration.
  4. Aerobic glycolysis.
  5. Factors influencing metabolic rates of bull spermatozoa.
- N. Physiology of Spermatozoa in the Female Reproductive Tract.
  1. Introduction.
  2. Site of semen deposition.
  3. Spermatozoa transport in the female reproductive tract.
  4. Survival of spermatozoa in the female reproductive tract.
  5. Interactions between semen and the female reproductive tract.
- O. Semen Collection
  1. Introduction.
  2. Methods of semen collection.
  3. Facilities for controlling animals.
  4. Procedures with the bull before and during collection.
- P. Semen Evaluation
  1. Introduction.
  2. Gross examination.
  3. Morphology of sperm cells.
  4. Concentration of sperm cells.
  5. Assessment of spermatozoan motility.
  6. Differential staining of live and dead spermatozoa.

    7. Measurements of metabolic activity of sperm cells.
    8. Resistance of spermatozoa.
    9. Livability of sperm cells.

Q. Significance of Semen Quality
    1. Introduction.
    2. The basis of statistical relationship.
    3. The variation in some semen-evaluation measurements.
    4. Concepts of fertility and its variance.
    5. The relationahip between semen characteristics and fertility.
    6. Recapitulation.

R. Principles and Techniques of Spermatozoan Preservation
    1. Introduction.
    2. Preservation at above-freezing temperatures.
    3. Preservation at below-freezing temperatures.
    4. Preservation by freeze drying.
    5. Preservation by chemical control.
    6. Bacterial contaminants of bull semen and their control.

S. Diluents and the Extension of Semen
    1. Introduction.
    2. Purposes of semen extension.
    3. Early diluents.
    4. Egg-yolk buffer diluents.
    5. Improvements in the yolk diluents.
    6. Whole-egg diluent.
    7. Glycine-containing diluents.
    8. The milk diluents.
    9. The glycerol-containing diluents.
    10. the illini variable temperature (IVT) diluents.
    11. Activation of spermatozoa by diluent additives.
    12. Color additives for semen identification.
    13. The extension rate and minimum number of spermatozoa per insemination.

T. Insemination of the Cow
    1. Introduction.
    2. Techniques of insemination.
    3. Site of insemination.
    4. Optimum time to inseminate.
    5. Amount of semen to inseminate.

U. Conception Rate and Factors Affecting Its Magnitude
    1. Introduction.
    2. The problem of sterility and reduced fertility.
    3. Measures of reproductive efficiency in cows.
    4. Possible causes of return to service after insemination.
    5. Order number of insemination and fertility level.
    6. Consistency or repeatability of fertility level in cows from one service period to another.
    7. Measuring the reproductive efficiency of bulls.
    8. The fertility level characteristic of bulls used in artificial insemination.

V. Physiological and Psychological Causes of Lowered Reproductive Efficiency
    1. Introduction.
    2. Age of animals.
    3. Season of year.
    4. Endocrine disturbances in the cow.
    5. Endocrine disturbances in the bull.
    6. Psychological disturbances.

W. Management Factors Affecting Reproductive Efficiency of the Cow
    1. Introduction.
    2. Good husbandry practices and other factors.
    3. Care of the growing heifer.
    4. Age and size at first breeding.
    5. Calving interval.
    6. Interrelationship of lactation and reproduction.
    7. Nutrient requirements for reproduction.

X. Management Practices Affecting Reproductive Efficiency of the Bull
    1. Introduction.
    2. Expected and useful life of bulls.
    3. The growing bull.
    4. Relationahip of age and body size to semen production.
    5. Frequency and extent of use.
    6. Stress.
    7. Nutrient requirements of growing dairy bulls.
    8. Nutrient requirements of mature dairy bulls.
    9. Exercise.
    10. Transport and fertility.
    11. Safety practices.

IV. Motivation

A. Field trips to artificial insemination bull studs.
B. Bulletin board displays.
C. Up-to-date instructional media on artificial insemination and animal reproduction.
D. Films, filmstrips, slides.
E. Demonstrations of proper heat detection techniques.

V. Learning Activities

A. Occupational experience programs.
B. Dissection of reproductive tract of a cow.
C. Artificial insemination technician speak to class.
D. Label reproductive tract of female.
E. Label reproductive tract of male.
F. Diagram hormone chart showing cause and effect.

VI. Materials Needed

A. Books
   1. Salisbury, VanDemark. *Physiology of Reproduction and Artificial Insemination of Cattle*, W. H. Freeman and Company. 1961.
   2. E.S.E. HAFEZ. *Reproduction in Farm Animals*. Lea and Febiger. 1962.
   3. Frandson. *Anatomy and Physiology of Farm Animals*. Lea and Febiger. 1969.
   4. Mortenson and Juergenson. *Approved Practices in Dairying*. Interstate. 1977.
   5. Bundy and Diggins. *Dairy Production*. Prentice-Hall. 1979 4th Edition.
   6. Ensminger. *Beef Cattle Science*. Interstate. 1976.
   7. Hutt, Frederick B. *Animal Genetics*, The Ronald Press Co., 1964.
   8. H. A. Herman and F. W. Madden. *The Artificial Insemination of Dairy and Beef Cattle* (including techniques for goats, sheep, horses and swine); 4th ed. Columbia, Mo., Lucas Brothers. 1972.

B. Bulletins and Pamphlets
   1. "Dairy Cattle Sterility." Hafs and Boyd, Hoard's Dairyman.
   2. "Animal Technician Brochure" and information packet, Agricultural Division, Madison Area Technical College, Madison, Wisconsin.
   3. Dairy Herd Management, Jan. 1977, author D. M. Galton, "A.I. Management Means Heat Detection and Good Records."
   4. Dairy Herd Management, Jan. 1977, author D. Halsey, "Direct Herd Breeding; A New Hat for the Dairyman."

C. Transparencies
   1. Cattle Breeding. NASCO Agricultural Sciences, Fort Atkinson, Wisconsin 53538.
   2. Artificial Insemination. NASCO Agricultural Sciences, Fort Atkinson, Wisconsin 53538
   3. Artificial Insemination in Beef Cattle. Hobar, St. Paul, Minnesota 55112

D. Slides
   1. Signs of Heat in Cattle. NASCO Agricultural Sciences, Fort Atkinson, Wisconsin 53538.
   2. Recovery of the Uterus After Calving. NASCO Agricultural Sciences, Fort Atkinson, Wisconsin 53538.
   3. "Miracle of Reproduction." Midwest Breeders, Shawano, Wisconsin.

E. Films
   1. "A Veterinarian Looks at Functional Type." Holstein-Friesian Association of America, Brattleboro, Vermont 05301.
   2. "Better Living Thru A.I." Tri-State Breeders, Westby, Wisconsin.
   3. "Known by the Sires We Keep." Tri-State Breeders, Westby, Wisconsin.

LIVESTOCK SELECTION AND EVALUATION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the livestock selection areas and relate these factors to his/her own specific needs and aspiration.
B. Identify and compare the characteristics of the various breeds.
C. Identify and list all parts of an animal in each specie.
D. Place classes of animals with type as the criteria for evaluation.
E. Use a systematic approach in giving oral/written reasons for a class placing.
F. Place a class of livestock utilizing production records as the criteria for evaluation.
G. Grade market classes of livestock and carcasses according to muscling and finish.

II. Concepts to Develop

A. There are career opportunities in the livestock industry for young men and women at all levels of educational preparation.
B. A systematic evaluation procedure is essential in livestock selection and grading.
C. A knowledge of breed characteristics is vital when selecting replacements for the breeding herd.
D. Production records are a useful tool in livestock evaluation and selection.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment information.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relative to potential employment.
B. Why judge livestock?
  1. Success depends on the ability to select the best animals.
    a. Breeding stock.
    b. Market and slaughter animals.
  2. Acquiring judging skill.
    a. Formal instruction.
    b. Experience.
  3. Basic characteristics of the livestock judge
    a. Desire to know livestock
    b. Mental image of the ideal type.
    c. Develop the power of observation.
    d. Develop the ability to make a logical analysis.
    e. Develop the independence of thought.
    f. Develop the ability to give effective reasons.
      1) Written.
      2) Oral.
    g. Develop familiarity with all body parts of the various breeds.
      1) Name and location of each body part.
      2) Function of each body part.
      3) Degree of importance of each body part.
C. Examination and placing of animal classes.
  1. Use an accepted system of evaluation.
  2. The value of first impressions.
  3. Viewing from a distance (20-30 feet).
    a. View from the side.
    b. View from the rear.
    c. View from the front.
  4. Close-up inspection—place hands on the animal when permitted to do so.
    a. Determine depth, fullness and smoothness.
  5. Observe animals on the move
    a. Lameness.
    b. Other leg and foot defects.
  6. Comparative judging.
    a. Evaluate and rate each animal in relationship to the ideal specimen.
  7. Natural division of classes.
    a. By pairs or groups.
    b. Easy top animal.
    c. Easy bottom animal.
D. Reasons for placing the class
  1. Begin by naming the class and state the order in which the animals were placed.
  2. State the reasons why an animal is placed at the top of the class. Admit any weaknesses that he or she may have.
  3. State reasons why the top animal is placed over the second, the second over the third and the third over the fourth. A few remarks concerning the last place animal is usually appropriate. Always point out weaknesses which exist when placing one animal above the other.
  4. Conclude your remarks by again naming the class and giving your final placing.
E. Examination and grading of carcass class
  1. Use an accepted method of evaluation. (USDA grades).
  2. The value of first impressions.
  3. Close up inspection.
    a. Determine marbling
    b. Fat cover
    c. Muscling
    d. Cutability

IV. Motivation

A. Field trips to buying stations and processing plant.
B. Livestock buyer or judge speaks to class.
C. Slides, films, filmstrips.
D. Bulletin board displays.

V. Learning Activities

- A. Field trips to local farms to judge various classes of livestock.
- B. Enter livestock judging contests.
- C. Participate in local fairs and shows.
- D. Judge livestock classes by utilizing pictorial classes obtained from breed associations.
- E. Enter meat judging contest.

VI. Materials Needed

- A. Books:
  - 1. Acker, Duane, Animal Science and Industry, Prentice Hall, Inc., 1971.
  - 2. Anderson, A. L., and Kiser, J. J., Introductory Animal Science, The Mac Millin Co., 1963.
  - 3. Beadle, George and Muriel, The Language of Life, Doubleday and Co., 1966.
  - 4. Brewbaker, James. L., Agricultural Genetics, Prentice Hall, Inc. 1964.
  - 5. Briggs, Hilton M., Modern Breeds of Livestock, The Mac Millin Co., 1969.
  - 6. Cole, H. H., Introduction to Livestock Production, W. H. Freeman and Co., 1962.
  - 7. ________, Introduction to Livestock Production, W. H. Freeman and Co., 1966.
  - 8. Ensminger, M. E., The Stockman's Handbook, 3rd edition, The Interstate, 1978.
  - 9. Garrigus, W. P., Introductory Animal Science, 3rd edition, J. B. Lippincott Co., 1960.
  - 10. Hutt, Frederick B., Animal Genetics. The Ronald Press Co., 1964.
  - 11. Snapp, R. R., and Neuman, A. L., Beef Cattle, 5th edition, John Wiley & Sons, 1966.
  - 12. Youtz, H. G., and Carlson, A. C., Judging Livestock, Dairy Cattle, Poultry and Crops, Prentice Hall, 1970.
  - 13. Zeuner, Frederick, A History of Domesticated Animals, Harper and Row, 1963.
  - 14. Beef Production, Diggins and Bundy, 3rd Ed. (1971) Prentice-Hall.
  - 15. Swine Production, Bundy and Diggins, 3rd edition (1975) Prentice-Hall.
  - 16. Livestock Judging and Evaluation, Beeson, Hainsley, Nordby, 1978.
  - 17. The Meat We Eat, Romans and Ziegler, 11th edition, Interstate. 1977.
  - 18. Sheep and Wool Science, Ensminger, 4th edition, Interstate. 1970.
- B. Booklet:
  - 1. "Recommended Guides for Carcass Evaluation & Contests," American Meat Science Association, 36 S. Wabash Ave., Chicago, Illinois.
  - 2. Student Study Manual, Arthur Pynnonen Ph.D. National Vo-Ag. Book Co. (1973)
- C. Bulletins:
  - 1. Future Farmers of America National Contests, Future Farmers of America Foundation, Inc. Bulletin No. 4, 1979, Office of Education, Department of Health, Education and Welfare, Washington, D. C. 20202.
  - 2. National Livestock and Meat Board, Literature and Educational Services, 36 South Wabash Ave., Chicago, Il 60603. Booklet 101 "Meat Judging Handbook" 72 pages.
  - 3. United States Department of Agriculture Bulletins Livestock Division, Ag. Marketing Service, Washington, D. C. 20250.

    Farmers' Bulletin 1263, Breeds of Swine

    Farmers' Bulletin 2196, Finishing Beef Cattle

    Farmers' Bulletin 2126, The Farm Beef Herd

    Service and Regulatory Announcement No. 112, Official U.S. Grades for Slaughter Cattle, and posters illustrating these grades.

    Service and Regulatory Announcement No. 99, Official U.S. Standards for Grades of Carcass Beef.

    Service and Regulatory Announcement No. 123, Official U.S. Standards for Lamb, Yearling Mutton, and Mutton Carcasses.
  - 4. University of Wisconsin

    Ag. Extension Service Special Circular No. 63, Jan. 1961 Livestock Selection Guide

    Circular No. 497, How to Feed, Fit, and Show Lambs

    Special Circular No. 36, Buying and Selling Feeder Pigs

D. Periodicals:
  1. Agricultural Education Magazine, Oct., 1967, Vol. 40, page 80, "A New Concept in Visual Aids," John Blessent.

E. Slides:
  1. Iowa State College, Ames, Iowa, Department of Animal Science. Set of approximately 25 slides showing the entire carcass (beef) cut crosswise into sections showing animals of varying degrees of finish.
  2. Nasco, Ft. Atkinson, Wisconsin. Slides from Texas A & M showing classes of swine with cutout information. Approximately 60 slides. Other overlays depicting outlines and skeletal structure.

MARKETING DAIRY PRODUCTS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the marketing of dairy products and will be able to relate these factors to his/her own specific needs and aspirations.
B. List and discuss factors that contribute the importance of milk and dairy products.
C. List and discuss factors that affect the geographical location of the dairy cow.
D. Locate the leading states in milk and dairy products production.
E. Identify and list the stages in which milk moves from the farm to the consumer.
F. List and discuss market outlets that a farmer may choose for his milk.
G. Indicate and discuss significant highlights of the history of milk pricing.
H. Analyze and discuss the factors that influence prices of fluid milk.
I. Be familiar with the types of organizations that have developed in the coopertive marketing of milk and benefits the farmer gains from them.
J. Be familiar with and able to discuss the milk marketing orders.
K. List significant laws and regulations associated with milk and dairy products.
L. List and discuss the various standards and grades of milk and dairy products.
M. Discuss and/or explain the specific areas of the price support program.
N. List ways of gauging the profitability of dairy firms.
O. Describe the uses of milk and a few pertinent points relative to each of the manufactured products.
P. Discuss the significant effect that imports and exports have on milk and dairy products.
Q. Be familiar with current ways of expanding dairy product exports and the role that each segment of the dairy industry may play.
R. Explain how dairy production affects the outlook of marketing dairy products.
S. List and discuss reason for changes in the utilization of dairy products.
T. List the significant affect that governments and foreign trade have on the outlook for dairy products.

II. Concepts to Develop

A. There are career opportunities in the dairy industry for young men and women at all levels of educational preparation.
B. Milk and dairy products contribute significantly to the agriculture industry.
C. The dairy industry has specific centers of production due to such factors as geography, climate, and economics.
D. Market channels exist for milk and dairy products.
E. Milk has a specific pricing structure and is governed by specific regulations.
F. Profitability in dairy products is determined by two methods.
G. Milk has a variety of uses.
H. Imports and exports influence dairy product marketing.
I. The future of dairy product marketing is determined by a variety of factors.

III. Subject Matter to Teach

A. Careers
  1. Current and future employement needs.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
B. Market importance of milk and dairy products
  1. The farm value of dairy products.
  2. The per capita consumption of dairy products.

- C. Centers of production of dairy products
  - 1. Factors that affect the location of the dairy cow.
  - 2. Leading states in milk production.
  - 3. Leading states in butter, cheese and other dairy products.
- D. Market channels for milk and dairy products
  - 1. Three stages in which milk moves from the farm to the consumer.
  - 2. Choice of market outlet.
  - 3. Assembling dairy products from farms.
- E. Milk pricing and regulations
  - 1. The history of milk pricing.
  - 2. Factors influencing prices of fluid milk.
  - 3. Federal milk marketing orders.
  - 4. State milk control.
  - 5. Cooperative marketing of dairy products.
  - 6. Sanitary regulations of milk and dairy products.
  - 7. Standards and grades of milk and dairy products.
  - 8. State trade practice laws in the sale of fluid milk.
  - 9. The price support program.
- F. Profitability of dairy processing firms
  - 1. The two ways of gauging the profitability of dairy firms.
- G. Selling milk for manufacturing purposes.
  - 1. Number and size of milk manufacturing plants.
  - 2. Condenseries and powder plants.
  - 3. Ice cream and similar frozen desserts.
  - 4. Cream, butter and nonfat dry milk.
  - 5. Cheese factories.
  - 6. Condensed and evaporated milk.
- H. Imports and exports
  - 1. Import quotas on dairy products.
  - 2. Dairy products export potentials.
  - 3. Ways of expanding dairy product exports.
- I. Outlook for Dairy Products
  - 1. Affect of dairy production on the outlook.
  - 2. Factors that contribute to the changes in utilization of dairy products.
  - 3. The role of government programs in the outlook for dairy products.
  - 4. Foreign trade role in the outlook for dairy products.

IV. Motivation

- A. Field trip to milk processing plants.
- B. Visit a milk marketing organization.
- C. Class presentation by milk marketing representatives.
- D. Bulletin board displays.
- E. Show slides and films on marketing of dairy products.

V. Learning Activities

- A. Occupational experience program.
- B. Design a flow diagram of the market channels for milk and dairy products.
- C. Panel report on what methods of pricing are used in the market.
- D. Panel report on employment opportunities in the marketing of dairy products.
- E. Make up a display of the different dairy products.
- F. Analyze factors influencing the price of fluid milk.

VI. Materials Needed

- A. Books
  - 1. Modern Marketing of Farm Products. Mortenson. Interstate.
  - 2. Dairy Production. Diggins and Bundy. Prentice-Hall, Inc. 1979.
  - 3. Approved Practices in Dairying. Mortenson and Jurgenson. Interstate. 1977.
  - 4. Marketing Farm Products. Shepherd. National Farm Book Company. 1979.
  - 5. Dairy Cattle Science. Ensminger. National Farm Book Company. 1979.
- B. Bulletins and Pamphlets
  - 1. Several selections are available from: University of Wisconsin - Extension, 432 North Lake Street, Madison, WI 53706.
    These are listed in the Dairy Marketing section of Agricultural Publications No. J7CAAG. An example is R2595, "Economic Analysis of Dairy Marketing."
  - 2. "The Dairyman Goes To Market". American Dairy Association of Wisconsin, 4337 W. Beltline, Madison, WI.
  - 3. "Marketing Dairy Products", Pamphlet No. 2023a.
    Vocational Agricultural Service,
    University of Illinois
    434 Mumford Hall,
    Urbana, IL 61801.
- C. Films and filmstrips
  - 1. "Milk Marketing Today"
    Film Department
    Wisconsin Dairies
    Route 3, Baraboo, WI 53913.

2. Some films are available from:
Bureau of Audio-Visual Instruction
University of Wisconsin - Extension
Box 2093, Madison, WI 53701.

MARKETING LIVESTOCK

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the livestock marketing industry and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Compare the different methods of marketing livestock.
- C. Choose the best marketing system for the local area.
- D. Describe the current marketing opportunities available to area producers.
- E. Discuss the reasons for the seemingly wide price spread between what the producer gets for his livestock and what the consumer pays for choice cuts of meat.
- F. Describe the meat distribution channels.
- G. Contrast the various methods of selling and pricing.
- H. Suggest procedures which will help prevent losses in shipping.
- I. Describe a meat processing plant operation.
- J. Explain the key forces that determine the price of meat.
- K. Discuss the various points or levels in the marketing system.

II. Concepts to Develop

- A. There are career opportunities for young men and women at all levels of educational preparation in livestock marketing.
- B. Some feed additives may be detected in meat and therefore are banned.
- C. Federal meat inspection is an aid in safeguarding public health.
- D. Meat animals are not all steak and roasts.
- E. Several innovations in livestock marketing have occurred in recent years.
- F. Some marketing methods return more money to the farmer than others.

III. Subject Matter to Teach

- A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
- B. Area markets
  1. Names of local outlets.
  2. Distance.
  3. Location.
  4. Price.
  5. Feed and water at the market place.
  6. Insurance.
  7. Transportation.
  8. Other services offered.
  9. Number of buyers present—Competition in the market place.
- C. Trends and development
  1. Computerized selling.
  2. Innovations in auction markets.
  3. Changes in public markets.
- D. Role of the future's markets
  1. Cattle
  2. Hogs.
  3. Feeder cattle.

IV. Motivation

- A. Field trips to tele-a-market, auction market, local buying stations and central markets.
- B. Field trip to packing plants.
- C. Slides, filmstrips, and films.
- D. Bulletin board displays.
- E. Class presentations by marketing specialists.

V. Learning Activities

- A. Occupational experience programs.
- B. Plot market prices of live cattle and hogs for a period of one year- local and central market.
- C. Plot future prices of cattle and hogs for a period of one year.
- D. Plot prices on a graph and compare the percent of the consumer's dollar the farmer receives for meat with other agricultural products of the community.
- E. Prepare a bulletin board display depicting the functions carried on in a terminal public livestock market.
- F. Prepare a demonstration on practices which may be used to reduce losses in shipping livestock to market.

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VI. Materials

A. Books

1. Modern Marketing of Farm Products - 1977.
2. Marketing Farm Products - 1976 - National Farm Book Co.
3. Marketing of Agricultural Products - 1972 - National Farm Book Co.
4. Marketing of Livestock and Meat - Interstate.

B. Bulletins and Pamphlets

1. A2913 Futures Markets-Development and Language - University of Wisconsin - Extension.
2. R2820 Agricultural Market Information - University of Wisconsin - Extension.

C. Periodicals

1. Drovers Journal
2. Selections from: Wisconsin Agriculture Reporting Service"

   Wis. Dept. of Agriculture

   Trade and Consumer Protection

   801 West Badger Road

   Madison, WI 53713
3. Kiplinger Report
4. Wall Street Journal

D. Films and Filmstrips

1. Your Profit in Futures - Farm Film Foundation, 1425 H Street N.W., Washington, D.C. 20005.
2. Cattle - Fax: New Marketing Information Service, Modern Talking Picture Service, Inc. 2323 New Hyde Park Road, New Hyde Park, New York 11040.
3. Selections from: "Vocational Agriculture Service" University of Illinois, Mumford Hall, Urbana, Ill. 61801.
4. Selections from: "Bureau of Audio-visual Instruction" University of Wisconsin - Extension, Box 2093, Madison, Wisconsin 53701.

MEAT PROCESSING

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the meat processing industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Distinguish breed characteristics of beef, pork, lamb, veal and poultry.
C. Be conscious of health and sanitation requirements in meat processing.
D. Describe the job functions of the state and federal meat inspectors.
E. List and differentiate between the parts of market animals and poultry.
F. List and describe all U.S.D.A. grades of market animals and poultry.
G. List and discuss the techniques of slaughter of market animals.
H. Distinguish and name the retail meat cuts of market animals and poultry.
I. Distinguish and name the wholesale meat cuts of market animals and poultry.

II. Concepts to Develop

A. There are career opportunities in the meat processing industry for young men and women at all levels of educational preparation.
B. Breed identification is important.
C. State and federal legislation governs the meat industry.
D. Meat inspection methods are necessary.
E. The nutritional content of various meats differ.
F. An employee needs to understand the development and trends in the meat processing industry
G. U.S.D.A. grades of live and carcass animals are the standards of the industry.
H. Identification of wholesale and retail cuts are essential skills for meat processing.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job descriptions.
   3. Training requirements.
   4. Working conditions.

   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.
- B. Breed characteristics
   1. Beef breeds.
   2. Pork breeds.
   3. Sheep breeds.
   4. Veal breeds.
   5. Poultry.
- C. Health and sanitation in meat processing
   1. Health.
   2. Diseases and parasites of livestock and poultry.
- D. Meat inspection
   1. Ante and post-mortem inspection.
   2. Labeling.
   3. Import and export inspection.
- E. Part identification of market animals
   1. Parts of the beef and veal.
   2. Parts of the hog and lamb.
   3. Parts of poultry.
- F. Grades of market animals
   1. Beef and veal grades.
   2. Pork and lamb grades.
   3. Poultry grades.
- G. Slaughtering of market animals.
   1. Rendering insensible.
   2. Shackling and hoisting.
   3. Sticking and bleeding.
   4. Scalding and skinning.
   5. Removal of viscera.
   6. Splitting.
   7. Washing and shrouding.
   8. Cooling and storage.
   9. Wrapping.
- H. Wholesale cuts
   1. Beef and veal wholesale cuts.
   2. Pork and lamb wholesale cuts.
   3. Poultry wholesale cuts.
- I. Retail cuts
   1. Beef and veal retail cuts.
   2. Pork and lamb retail cuts.
   3. Poultry retail cuts.
- J. Occupations in the meat industry
   1. Production workers.
   2. Production supervisors.
   3. Mechanics.
   4. Quality control technician.
   5. Office workers and salesmen.
   6. Managers.

IV. Motivation

- A. Field trip to meat processing plant.
- B. Bulletin board displays.
- C. Processing owner class presentation.
- D. Meat inspector class presentation.
- E. Slide series on meat processing.
- F. Films on meat processing.

V. Learning Activities

- A. Occupational Experience programs.
- B. Design a flow diagram of a meat processing operation.
- C. Collect various canned and dried products.
- D. Determine freshness qualities of meat.
- E. Reports on various areas of meat processing.

VI. Materials Needed

- A. Books
   1. Bundy & Diggins. *Livestock and Poultry Production.* Prentice Hall. Current Edition.
   2. Ensminger. *Beef Cattle Science.* Interstate.
   3. Ensminger. *Sheep Science.* Interstate.
   4. Ensminger. *Swine Science.* Interstate.
   5. Ziegler. *The Meat We Eat.* Interstate.
- B. Bulletins and Pamphlets
   1. Ahrens and Thompson, "Livestock Selection, A Resource Unit". University of Wisconsin-Madison.
   2. National Livestock and Meat Board. "101 Meat Cuts". 36 S. Wabash Avenue, Chicago, IL 60603.
   3. National Livestock and Meat Board. "Lessons on Meat."
   4. VonRuden. "Resource Unit on Meat". Department of Agriculture, University of Wisconsin-Platteville.
   5. From: U.S.D.A. Consumer and Marketing Service,
      Livestock Division, Washington, D.C. 20250.
      "Pork Chart, Wholesale and Retail Cuts".
      "Pork Carcasses—U.S. Grades".
   6. From: U.S.D.A. Agricultural Marketing Service,
      U.S. Government Printing Office, Washington, D.C. 20250.
      "USDA Grades for Pork Carcasses", Bulletin #49.
      "USDA Yield Grades for Beef", Bulletin #45. July 1968.
      "Slaughtering, Cutting and Processing Pork".
      "How To Buy Poultry".
- C. Films and Filmstrips
   1. "Meat Identification Kit". Interstate.
   2. From: Nasco, 901 Janesville Avenue, Fort Atkinson, WI 53538.
      "Identification of Beef Cuts"
      "Identification of Pork Cuts"
      "Live and Carcass Grades"

METAL FABRICATION

I. Performance Objectives

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the metal fabrication industry and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Identify the more common metals used in metal fabrication.
- C. Select metals for a job according to basic physical and chemical properties, grade, and type.
- D. Perform the five basic heat treatment processes necessary to obtain appropriate metal characteristics.
- E. Read and translate welding, sheet metal and machinists, blueprints as to materials needed, and technical construction techniques and procedures.
- F. Identify and operate general precision equipment used in the metal fabrication industries.
- G. Set up, adjust, and operate AC, DC, MIG, TIG, spot, and oxy-acetylene welders.
- H. Demonstrate proficient skill in welding the various types of weld joints in all positions on mild steel, high carbon steel, aluminum, stainless steel and cast iron.
- I. Properly use and maintain all bench metal tools and equipment.
- J. Set up correctly and safely operate all sheet metal equipment in the school shop. (Squaring shear, box and pan break, forming rolls, combination head, bar fold, soldering furnaces, nib and punch, and power nibbler.)
- K. Lay out and construct sheet metal projects using a variety of sheet metal joints and fasteners.
- L. Set up, adjust, and safely operate a metal turning lathe and a milling machine.
- M. Calculate feeds and speeds on a metal turning lathe and on a milling machine.
- N. Perform all basic operations on a lathe and mill within a specified tolerance determined by the instructor.
- O. Set up, adjust, and safely use a drill press for precision drilling.
- P. Estimate the repair or construction costs of a project.
- Q. List and describe the phases of product development from original idea to market product.
- R. Develop a matrix showing schematically the possibilities and alternative routes of professional improvement at the post secondary level.

II. Concepts to Develop

- A. There are career opportunities in metal fabrication for young men and women at all levels of educational preparation.
- B. Metal fabrication includes a cluster of skilled trades which are closely correlated.
- C. Metal fabrication includes all the processes from the raw stock to the finished product.
- D. An understanding of basic metallurgy is a necessary knowledge in many areas of metal fabrication.
- E. The higher the competency level in the skilled areas the more likely one is to be successful on the job.
- F. Many of the skilled areas of metal fabrication require an above average comprehension of basic mathematics and numerical relationships.
- G. Cognitive and affective processes or behaviors are equally important to psychomotor behavior development in the preparation of individuals for employment in the metal fabrication trades.

III. Subject Matter to Teach

- A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
- B. Metallurgy
  1. Kinds of metal.
  2. Mechanical, physical and chemical properties of metal.
  3. Kinds and grades of steel.
  4. Methods of making iron and steel.
  5. Metal identification tests.
  6. SAE and AISI steel specifications.
- C. Blueprint reading
  1. Welding, sheet metal and machinists blueprints.
     - a. How to read and interpret.
- D. Measurement
  1. Why measurement is so vitally important in metal working.

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2. Types of measurement tools and how to use them.
    a. Micrometers.
        1. Outside.
        2. Inside.
        3. Depth.
        4. Thread pitch.
        5. Direct reading.
    b. Calipers.
        1. Inside.
        2. Outside.
        3. Vernier.
    c. Steel rules.
    d. Test dial indicator.
    e. Telescope gauges.

E. Welding fabrication
    1. Types of welders.
        a. Alternating current (AC).
            1) Principles of operation and set up procedures.
            2) Uses.
        b. Direct current (DC).
            1) Principles of operation and set up procedures.
            2) Uses.
        c. Metal inert gas (MIG).
            1) Principles of operation and set up procedures.
            2) Uses.
        d. Tungsten inert gas (TIG).
            1) Principles of operation and set up procedures.
            2) Uses.
        e. Spot welders.
            1) Principles of operation and set up procedures.
            2) Uses.
        f. Oxy-acetylene welding.
            1) Principles of operation and set up procedures.
            2) Uses.
    2. Welding safety.
    3. Position welding--perform the following types of welds on both the AC and DC welders.
        a. Beads (flat).
        b. Pads (flat).
        c. Butt welds (flat).
        d. Fillet welds (flat).
        e. Vertical bead (up).
        f. Vertical butt (up).
        g. Vertical fillet (up).
        h. Vertical bead (down).
        i. Vertical butt (down).
        j. Vertical fillet (down).
        k. Overhead beads.
        l. Overhead butts.
        m. Pipe welds.
        n. Cutting.
        o. Piercing holes.
        p. Hard surfacing.
        q. Cast iron (beads.)
        r. Cast iron (butts).
        s. Carbon arc torch.
    4. Position welding operations on oxy-acetylene welding.
        a. Melt strips.
        b. Tent welds.
        c. Butt welds.
        d. Butt welds with filler.
        e. Fillet welds and filler.
        f. Horizontal butts with filler.
        g. Horizontal fillets with filler.
        h. Brazing (butts).
        i. Brazing (fillets).
        j. Cutting holes.
        k. Cutting.
    5. Spot welding operations.

F. Sheet metal fabrication
    1. Soldering.
        a. Principles of soldering.
        b. Equipment and fluxes.
        c. 1. Coppers.
            2. Electric soldering guns.
            3. Electric soldering irons.
            4. Acid core solder.
            5. Rosin core solder.
            6. Bar solder.
            7. Wire solder.
        c. Sheet metal equipment.
            1. Squaring shears.
            2. Box and pan break.
            3. Forming rolls.
            4. Combination head.
            5. Sheet metal stakes.
            6. Hand nib and punch.
        d. Sheet metal joints.
            1. Construction.
            2. Uses.
        e. Procedures for securing sheet metal joints.
            1. Self-locking.
            2. Soldering.
            3. Riveting.
            4. Sheet metal screws.
            5. Spot welding.
        F. Sheet metal safety rules

G. Machining.
    1. Principles of the metal lathe.
    2. Types of lathes.
    3. Lathe parts and functions.
    4. Calculating feeds and speeds.
    5. Lathe safety rules.
    6. Set up and operation for:
        a. Mounting stock in 3 jaw chuck.
        b. Drilling centers.
        c. Mounting between centers.
        d. Straight turning.
        e. Turning to a square shoulder.
        f. Tapering.
        g. Knurling mild steel.
        h. Threading.
        i. Boring holes.

    7. Precision calibration.
    8. Care of the lathe.
  H. Milling
    1. Principles of milling.
    2. Types of mills.
    3. Mill parts and functions.
    4. Calculating feeds and speeds.
    5. Safety rules for milling.
    6. Set up and operation for:
      a. Milling flat surfaces.
      b. Squaring stock.
      c. Face milling.
      d. Side milling.
      e. Milling slots.
      f. Drilling.
      g. Boring.
      h. Machining angular surfaces.
      i. Milling slots and keyways.
      j. Milling multi-level surfaces.
    7. Care of the milling machine.
  I. Production line work (last nine weeks of second semester, the class will design, fabricate, provide quality control, and market a product)

IV. Motivation

A. Employment records of previous graduates and listings of present employment opportunities.
B. Field trips to metal fabrication industries.
C. Tradesmen and employer discussions with the class.
D. Demonstrations.
E. Project and skill specimen displays.
F. Films, filmstrips and slides.

V. Learning Activities

A. Occupational experience programs.
B. An in-depth study of the metal working occupation cluster.
C. Construct metal projects.
D. Repair machinery and equipment.
E. Mass production project in which students execute every phase from original design to marketing.
F. Operate machines used in the metal fabrication industry.

VI. Materials Needed

A. Books
  1. General Industrial Machine Shop — Johnson — Charles Bennett — Peoria, Illinois
  2. Machine Shop Operations & Setups — 4th Edition — Lascoe, Nelson, Porter — American Technical Society
  3. Machine Tool Technology — Repp & McCarthy — McKnight — 1979
  4. Machine Trades Blueprint Reading — 6th Edition — Ihne & Streeter
  5. Machine Shop Skill Manual — Drill Press Vise - Wasiloff — American Technical Society
  6. Machine Shop Skill Manual — Parallel Clamps — Wasuloff — American Technical Society
  7. Machine Shop Skill Manual — Threads — Wasiloff — American Technical Society
  8. Machinists Library — Black — 1970 — Audel
  9. Metallurgy — 5th Edition — Johnson & Weeks — American Technical Society
  10. Metallurgy — Theory & Practice — Allen — American Technical Society
  11. Modern General Shop — Brown, Wagner, Boyd, Garrish — 1975 — Goodheart-Willcox
  12. Plumbing — Installation & Design — Ripka - American Technical Society

The following Metals Handbooks are available from the American Society for Metals, Metals Park, Ohio — 44073. Members receive 40% Discount Membership = $25.00 per year — 1979 membership fee.

Metals Handbook — 8th Edition,
Volume 2 — Heat Treating, Cleaning & Finishing — 1964
Volume 3 — Machining — 1967
Volume 4 — Forming — 1968
Volume 5 — Forging & Casting — 1970
Volume 6 — Welding & Brazing — 1971
Volume 10 — Failure Analysis & Prevention — 1975

The following "Source Books" are available from the American Society for Metals, Metals Park, Ohio — 44073. Members save $5.00 per book.

1. Source book on — Aluminum Alloys — 1978.
2. Source book on — Cold Forming — 1974.
3. Source book on — Ductile Iron — 1977.
4. Source book on — Failure Analysis — 1974.
5. Source book on — Forming Sheet Steel — 1976.
6. Source book on — Heat Treating — Materials & Processes — 1975.
7. Source book on — Heat Treating — Production & Engineering Practice.

8. Source Book on — Materials Selections — Volume 1 — 1977.
9. Source book on — Materials Selection — Volume 2 — 1977.
10. Source book on — Stainless Steels — 1976.

"Case Histories In Failure Analysis" — 1979 — American Society for Metals — Metals Park, Ohio — 44073.

Note: For additional references in the welding area — see the units on Arc Welding and Gas Welding.

B. Films
1. "Adventures in Abrasives," Norton Company.
2. "Arc Welding Electrode Selection," Hobart Bros. Co.
3. "Braze Welding," Red Arrow Sales.
4. "Drama of Metal Forming," Shell Film Library.
5. "Files — How to Choose and Use Them," Simonds Saw and Steel.
6. "Futures in Welding," National Welding Supply Association.
7. "Hard Facing," Red Arrow Sales.
8. "How Metals Behave," American Society for Metals.
9. "How to Select the Right Grinding Wheel," Norton Company.
10. "Magic Wand of Industry — Arc Welding," Lincoln Electric Company.
11. "Making Steel Behave," Association Films Inc.
12. "Metal Band Sawing — Tips and Techniques," Simonds Saw and Steel.
13. "Mig and Tig Welding of Aluminum," Reynolds Aluminum.
14. "Modern Steel Making," U.S. Steel Corporation.
15. "The Oxy-Acetylene Flame — Master of Metals," Bureau of Mines.
16. "Prevention and Control of Distortion in Arc Welding," Association Films Inc.
17. "A Story of Arc Welding," Bureau of Mines.
18. "Use and Care of Twist Drills," Cleveland Twist Drill Co.

METALS, AGRICULTURAL

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment on the farm or part time employment involved in routine repairs of farm machinery and equipment and will be able to relate these factors to his/her own specific needs and aspirations.

B. Be familiar with the common metals used in farm shop tools and the types of steel and cast iron used in farm machinery and equipment.

C. Select the metal that will do the best job in farm shop applications.

D. Perform the five heat treating processes to obtain or restore desired metal characteristics.

E. Understand the tap and die system - (N. C., N. F., and Metric thread system) — and be able to consult a chart to drill the corect hole for tapping a particular size.

F. Be able to sharpen all common tools used on the farm — drill bits, cold chisels, plane iron, wood chisels, auger bits, shears, snips, hatchets, axes, and similar shop tools.

G. Perform common equipment repair jobs as, replace handles in forks, shovels, hoes, rakes, hammers, sledges and similar items.

H. Set up, adjust and use a drill press for precision drilling.

I. Fabricate bolts and nuts for special applications.

J. Fabricate useful items for the farm as steel gates, steel saw horses, steel drain pans, bale hooks, sledges and similar projects.

II. Concepts to Develop

A. There are many opportunities to use the skills, whether on a farm or employed in related work.

B. Agricultural metal work involves a variety of semi-skilled and skilled trades.

C. Understanding heat treating, the various kinds of steel, cast irons and other metals is essential to long tool and equipment life.

D. Tool sharpening and proper reconditioning is essential in days of spiraling materials cost.

E. Additional skills in farm shop can lead to part time employment or full time employment with farm machinery and equipment dealers.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job description.
  3. Training requirements
  4. Working conditions
  5. Opportunity for advancement
  6. Other factors relating to student needs and aspirations

B. Safety in the agricultural metals field
  1. The general safety rules for the shop
  2. Safety instructions for the use of hand and power tools
  3. Safety regulations when working with electricity
  4. Safety concepts and regulations which apply to the occupational field (OSHA)

C. Tool identification and conditioning
  1. Identification of hand tools
  2. Identification of power tools and component equipment
  3. Select and use power grinder
  4. True grinding wheels
  5. Replace grinding wheels
  6. Sharpen farm tools and shop tools
  7. Reshape screw driver tip
  8. Sharpen cold chisels
  9. Sharpen twist drills
  10. Sharpen auger bits
  11. Sharpen plane irons and wood chisel
  12. Sharpen farm and garden tools
  13. Recondition and sharpen saws of all types

D. Cold metal work
  1. Identification of metals
  2. Select and use layout tools
  3. Cutting cold metal
  4. Shape stock
  5. Filing — care of files
  6. Drilling — correct speed
  7. Tapping and threading
  8. Bolts and rivets
  9. Remove broken bolts (E-Z-Out)
  10. Correct use of hacksaw

E. Hot metal work
  1. Heating metal
  2. Correct use of anvil
  3. Cut hot metal on the anvil
  4. Draw out metal
  5. Up-set metal — enlarge
  6. Bend and twist metal
  7. Make an "eye" — correct size
  8. Punch holes in hot metal
  9. Heat treat steel
  10. Shape and temper a cold chisel or wrecking bar

F. Soldering
  1. Sheet metal preparation
  2. Use of acid-core & resin core solder
  3. Repair leaks in pails, funnels and similar equipment

IV. Motivation

A. Field trip to a successful farmer's farm repair shop

B. Check the cost of buying new tools and equipment with reconditioning old tools.

C. Pride in projects and display of skill specimens

D. Demonstrations

V. Learning Activities

A. Occupational experience programs

B. Proper use of all farm shop tools and equipment used in various repair jobs

C. Construct or fabricate items to repair or adapt farm machinery and equipment

D. Repair farm machinery and equipment

E. Sharpen and recondition all common farm shop tools

F. Fabricate useful items as a drill press vise, battery cable puller, chipping hammer, steel sledges, jig to drill round metal, and similar useful items.

VI. Materials Needed

A. Books
  1. Farm Mechanics Text and Handbook — Phipps — Interstate.
  2. Mechanics in Agriculture — Phipps — Interstate, 1977.
  3. Modern Agricultural Mechanics — Wakeman — Interstate — 1977.
  4. Planning, Organizing and Teaching Agricultural Mechanics — Bear and Hoerner — Nat. Farm Book — or Hobar Publications, 1234 Tiller Lane, St. Paul, Minn. 55112.
  5. The Farm Shop - Wakeman & McCoy - Macmillan, 1960.

NATURAL RESOURCES

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to conservation and natural resources and relate these factors to his/her own specific needs and aspirations.
- B. Review American environmental leaders.
- C. Develop his/her own personal conservation philosophy.
- D. Critique the conservation philosophy of political parties and politicians.
- E. Describe the proper methods of conserving natural inexhaustable resources, natural exhaustable resources, both replaceable and irreplaceable, human resources.
- F. Classify resources according to the above.
- G. Determine proper methods of conserving any resource according to the above.
- H. Define conservation.
- I. Discuss various uses of a natural resource.
- J. Describe five anticipated conflicts to the multiple uses of any local natural resource.
- K. Apply the basic principles of conservation to local natural resources.
- L. Categorize the aspects of ecology.
- M. Describe five reciprocal relationships between a living organism and its environment.
- N. Distinguish between a biotic and abiotic environment and to catalog local factors within each group.
- O. Visualize specific examples of interspecific and intraspecific environmental factors.
- P. Describe the "community concept" and list ten living members of local environments.
- Q. Diagram the food relationships which might exist in the above.

II. Concepts to Develop

- A. There are career opportunities in conservation and natural resources for men and women at all levels of educational preparation.
- B. Conservation is the wise use and management of natural resources.
- C. Ecology deals with the mutual relations between organisms and their environment.
- D. Ecology and conservation are interrelated.
- E. An understanding of ecology and conservation is essential to prevent conflicting decisions.
- F. Several criteria are used in classifying resources.

III. Subject Matter to Teach

- A. Careers
  - 1. Current employment information.
  - 2. Job description.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relating to student needs and aspirations.
- B. Developing a conservation philosophy
  - 1. Conservation vs preservation
  - 2. Natural Resources
    - a. Renewable: air, water, soil, forests, wildlife
    - b. Non-renewable: mineral, petroleum, clean renewables
    - c. Discuss how some resources may fit into both categories depending on aesthetic values
  - 3. Human resources
- C. Environmental History
  - 1. Indians vs settlers: land ethic, forests, buffalo, beaver
  - 2. Land policy, manifest destiny, public domain, homestead act.
  - 3. Lumber barons: 1810-1910
  - 4. Soil
    - a. 1852 — first strip mining
    - b. Overgrazing, poor soil use
    - c. 1880's — first prairie dust bowls
  - 5. Environmental leaders: Jefferson, Thoreau, Marsh, Pinchot, Teddy Roosevelt, Muir, Franklin D. Roosevelt (Civilian Conservation Corps, Soil Conservation Service, Tennessee Valley Authority), Leopold, Carson, Ehrlich, Commoner, Nader.
    - a. "Conservation is a state of harmony between man and the land." Aldo Leopold.
    - b. The wise use or responsible management of our natural resources.
  - 2. Resources need to be managed for the "greatest good" in the long term.
  - 3. May imply preservation, recycling, harvest

- 4. Multiple use: sharing a resource, used with differing objectives, forest, timber, livestock, recreation, flood protection.

- E. Ecology
  - 1. Definition: the science concerned with the interrelationship between living organisms, their environment and themselves, involves a reciprocal relationship.
    - a. environment includes—
      - 1) Abiotic: climate, soil, minerals, water, oxygen
      - 2) Biotic: interspecific and intraspecific competition
    - Community approach — each species and factor has a niche, a role, to provide for and use other species.
  - 2. Habitat
    - a. Habitat: place where a population lives
    - b. Limiting factors: checks against reproductive rate
  - 3. Food webs
    - a. Energy pyramids: calories and species
      - 1) 90% waste of energy between food levels
      - 2) Fewer wolves than deer
      - 3) Smaller wolf biomass than deer biomass
    - b. Trophic levels: herbivores, omnivores, carnivores, scavengers, decomposers
- F. Wildlife Management
  - 1. Population inventory of fish and game
    - a. Census: by sample or full count
    - b. Production rate: ratio of young in the following breeding season. Methods to determine young:
  - 2. Security and maintenance
    - a. Predators: helpful in keeping healthy prey populations, bounties ineffective
    - b. Overpopulation: proper harvest levels
    - c. Disease and parasites
    - d. Cyclic population
  - 3. Improvement
    - a. Provide missing habitat elements, or remove undesirable elements, good land use.
    - b. Control plant succession, planting, impoundments, fish shelters, level ditching, ponds.
  - 4. Restoration
    - a. Stocking fish
    - b. Reintroduction of extirpated species.
    - c. Not a substitute for good habitat or management.
  - 5. Research and Education
- G. Water Resources
  - 1. Hydrologic cycle
  - 2. World Supply
    - a. Oceans, 97%
    - b. Polar ice caps, 2%
    - c. Rivers, lakes, groundwater, atmospheric, 1%
  - 3. Use of Water
    - a. National and local uses
    - b. Agriculture — 60 billion gallons per day.
    - c. Industry - 48 billion gallons per day.
    - d. Residential/commercial — 12 billion gallons per day.
  - 4. Average vs household of four
    - a. Toilet, 100 gallons per day.
    - b. Bathing, 80 gallons per day.
    - c. Laundry, 35 gallons per day.
    - d. Kitchen, 27 gallons per day.
    - e. Other, 15 gallons per day.
  - 5. Water Quality Measures
    - a. Coliform index - human sewage
    - b. Dissolved oxygen (DO) — lower when bacteria breaking down organic matter.
    - c. Biochemical oxygen demand (BOD) — indicates organic load
    - d. Phosphates — limiting factor
  - 6. Water Pollution
    - a. Thermal: cooling from power plants, industry
    - b. Non-point: run-off not from a specified point, agriculture, storm sewers
    - c. Nutrients: algae blooms, low DO
    - d. Industrial: high BOD, heavy metals
  - 7. Waste Water Treatment Plants
    - a. Combined vs uncombined
    - b. Primary — physical and chlorine
    - c. Secondary — physical, biological, chlorine
    - d. Tertiary — Physical, biological, chemical, chlorine
  - 8. Septic Tank Systems
    - a. "Perc" tests
    - b. Types and installation

H. Air Pollution
1. Definition: impurities occurring at concentrations which adversely affect living organisms and their environment.
2. Major vs sources
   a. Transportation — 42%
   b. Stationary fuel consumption — 42%
   c. Industrial processes — 14%
   d. Forest fires — 10%
   e. Miscellaneous — 15%
3. Major vs contaminants
   a. Carbon monoxide — 47%
   b. Hydrocarbons — 15%
   c. Sulfur oxides — 15%
   d. Particulates — 13%
   e. Nitrogen oxides — 10%
4. Local sources, effects, recent changes
5. World wide trends
   a. Greenhouse effect — CO2
   b. Cooling effect — particulates
6. Temperature inversions
7. Measuring and controlling air pollutants

I. Other areas of study
1. Pesticides
2. Outdoor recreation
3. Land use planning
4. Environmental ethics
5. Politics and conservation decisions
6. Energy and mineral resources
7. Fish and wildlife management
8. Forestry
9. Soil Conservation

IV. Motivation

A. Fieldtrips to a bog, marsh, prairie, forest, clean water source, polluted lake or stream, feed lots, recycling operation, water treatment plant, city land fill, game farm, fish farm, preserves and refuges.

B. Resource speakers from the DNR, SCS, water or soil lab testing station, forest service.

C. Slides and filmstrips
1. Vocational Education Publications, California Polytechnic State University filmstrips
   a. Managing Wildlife
   b. Game Bird Management (I and II)
2. Vocational Education Resource Materials Center, Vocational Education Center, Madison
   a. Glacial Geology of Wisconsin

V. Learning Activities

A. Develop charts of food levels using species from communities visited.

B. Develop a priority list for local resources.

C. Develop a plan to combat local pollution problems.

D. Lay out a campground.

E. Develop an environmental impact statement for a local building project.

F. Occupational experiences in all phases of natural resource management.

G. Study the history of Wisconsin deer harvests from settlement.

VI. Materials Needed

A. Books
1. Andrews, *Freshwater Ecology,* Prentice-Hall, 1972.
2. Andrews, *Environmental Pollution,* Prentice-Hall, 1972.
3. Leopold, *Sand County Almanac,* Ballantine, 1974.
4. Commoner, *The Closing Circle.*
5. Davis, *Ecology and Conservation of Natural Resources,* Clark, 1973.
6. Dasmann, *Environmental Conservation.* Wiley and Sons, Inc., 1972.

B. Pamphlets
1. "Understanding a Modern Sewage Treatment Plant." UW-Extension
2. "Wildlife, People and the Land." DNR
3. "Endangered Animals in Wisconsin." DNR
4. "Wisconsin Game Fish." DNR
5. "Working for Clean Water." DNR
6. "Water Pollution."
   Scientists' Institute for Public Information, 30 E. 68th, NY, NY.

C. Films
1. Free. Forest Service Films: John Hall Film Service, 2718 W. Atkinson Avenue, Milwaukee, Wis. 53209.
   a) "Forests for Wildlife"
   b) "Logging in Wisconsin"
   c) "Forest Patterns"
   d) "Think Like a Mountain"
   e) "Of People, Land and Planning"
2. Free. John Deere Films, 2323 New Hyde Park Rd., New Hyde Park, NY, 11040
   a) "Aquaculture" 31222
   b) "No Limit Catfish Farming" 4014

3. Free. National Wildlife Federation Films, 1412 16th Street, N.W. Washington, D.C. 20036
    a) "We Can Save The Eagle"
4. Free. Midland Coop Films, 2021 E. Hennepin, Minneapolis, Minn. 55413
    a) "Man and the Natural Environment"
    b) "Prairie Ducks"
    c) "Land of Loons"
    d) "Marsh Waters"
5. BAVI films, Madison, 53706
    a) "Installing Septic Tanks" 1779
    b) "Lake Renewal Techniques" 9473
    c) "Wildflowers of the Upper Midwest" 6840
    d) "Nonpoint '83" 1832
    e) "Wisconsin's Air" 9326
    f) "Recycling" 3979

PARLIAMENTARY PROCEDURE

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Understand and use basic parliamentary terms.
B. List the offices and describe the duties associated with the offices of an organization.
C. Use the gavel correctly.
D. Conduct a meeting.
E. Introduce an item of business.
F. Correctly state a motion or modify or change a question under consideration.
G. Refer an item of business to a committee.
H. Stop debate and call for an immediate vote.
I. Ask for a point of order.
J. Explain how to extend or limit the time of debate.
K. Describe the procedure to use to prevent a vote on a motion.
L. Demonstrate the technique used to consider a question a second time.
M. Describe the procedure to use to object to the consideration of a question.
N. State an appeal from the decision of the chair.
O. Properly ask for or gain parliamentary procedure information.
P. Properly handle a question of privilege.
Withdraw a motion.
Call for the division of the assembly.
Set the time for a future meeting.
Dismiss a meeting.

II. Concepts to Develop

A. Business can be transacted in an orderly fashion when the rules of parliamentary procedure are followed.
B. Each member of an organization should know how to effectively participate in a meeting.
C. Each member of an organization should know how to properly conduct a meeting.
D. The rights of the minority must be protected while carrying out the will of the majority.
E. Meetings are strengthened when correct parliamentary procedure is practiced.
F. A knowledge of parliamentary procedure is essential to those who function as leaders of organizations.
G. The gavel is an instrument of authority.
H. Any member of an organization may introduce [illegible] item of business.

III. Subject Matter to Teach

A. The role of parliamentary procedure in the conduct of meetings.
    1. Purpose.
        a. Enable people to conduct business in an orderly fashion.
    2. Need for establishing a procedure for the conduct of meetings.
        a. Members know what to expect.
        b. Greater number of participants.
        c. Important items are not overlooked.
    3. Types of motions and their rank according to precedence.
        a. Privileged motions.
        b. Incidental motions.
        c. Subsidiary motions.
        d. Principal motions.
        e. Motions that bring a question again before the assembly.
    4. Agenda — order of business.
        a. Call to order.
        b. Opening ceremony.
        c. Roll call or announcement of attendence.
        d. Officer reports.
            1) Secretary's report.
            2) Treasurer's report.
            3) Other officer's report.
    5. Committee reports.
    6. Unfinished business.
    7. New business.
    8. Closing ceremony.

9. Adjournment.
10. Recreation and refreshments.
11. Special programs — can be inserted anyplace in the meeting which is convenient for the speaker.

B. Parliamentary terms — their meaning and use.

Adhere	- attached to.
Adjourned meeting	- a meeting that is a legal continuation of a previous meeting, the meetings making up one session.
Adopt	- accept or agree to.
Agenda	- an outline of the order of business which is to come before the group that session.
Assembly	- the members of a society that have assembled for the transaction of business.
Ballot	- a secret vote, written on a slip of paper.
Bylaws	- fundamental rules or laws of an organization (also used to include constitution).
Committee	- a group of members selected for specific duties.
Dilatory motion	- a frivolous or absurd motion used to delay action.
Ex officio	- by virtue of office (the president may be an ex officio member of certain committees).
General consent	- consent without a single objection (also called unanimous consent).
Germane	- closely related to or having a direct bearing on the pending question.
Indecorum	- improper conduct or behavior.
Main motion	- a motion that brings business before the assembly.
Majority	- more than half.
Majority vote	- more than half of the votes cast.
Meeting	- a single official gathering to transact business.
Member	- an individual having the right to full participation in meetings (right to make motions, debate, and vote).
Minutes	- the written report of the proceedings of a meeting.
Motion	- a formal proposal that certain action be taken.
New business	- matters presented to the assembly for consideration that had not been carried over from previous meetings.
Parliamentary procedure	- rules used by an organization to conduct its meetings.
Pending question	- a motion that has been stated by the chair and is under consideration by the assembly.
Plurality vote	- largest number of votes given to any of the choices when three or more choices are possible.
Precedence	- order of priority of motions.
Prevailing side	- the winning side after a vote.
Previous notice	- announcement that a particular motion will be introduced at the next meeting.
Pro tem	- temporary, for the time being.
Putting the question	- placing the motion before the assembly for a vote.
Question	- a motion.
Quorum	- the minimum number of members that must be present at a meeting for business to be legally transacted.
Roll call vote	- a vote taken by calling out the names of the members for the purpose of recording how each member votes.
Rules of order	- rules that relate to parliamentary procedure.
Session	- a meeting or series of connected meetings devoted to a single order of business.

Special committee	- a committee formed to perform a special function and will dissolve upon completion of its task (also called ad hoc committee).
Standing committee	- permanent committee that performs continuing functions.
Standing rules	- rules that relate to details of administration rather than relating to parliamentary procedure.
Unfinished business	- business carried over from the previous meeting.
Vote	- an expression of opinion or choice, either positive or negative made by a member or group of members.
Yield	- concede to, give way to.

C. The development of awareness — proficiency in parliamentary procedure through simulated meetings

1. Kinds of offices and the duties of each.
2. Procedure for selecting officers.
3. Proper use of the gavel.
4. How to assume the position of the chair.
5. Proper procedure for obtaining the floor.
6. The types and purposes of the following motions:

   RANKING MOTIONS

   A. Privileged Motions
      1. Fix the time to which to adjourn (sets the time for the next succeeding meeting).
      2. Adjourn (end meeting).
      3. Recess (takes a break in the meeting).
      4. Raise a question of privilege (permits a request concerning the rights of the assembly to be brought up immediately).
      5. Call for the orders of the day (procedure used to require the assembly to conform to the adopted agenda).

   B. Subsidiary Motions
      1. Lay on the table (delays action on a motion).
      2. Previous question (stops debate and calls for immediate vote).
      3. Limit or extend limits of debate (limits or extends time for debate on a motion).
      4. Postpone to a certain time (delays actions on an item of business for a specific time).
      5. Refer (puts an item of business in the hands of a committee).
      6. Amend (changes the intent of meaning of a motion).
      7. Postpone indefinitely (prevents a vote on a motion and may kill it).

   C. Main Motions (motions that bring business on the floor)
      1. Ratify (a motion to approve action already taken by a member or a group of members without the consent of the chapter).

   NON-RANKING MOTIONS (requires the chairman to make a ruling in enforcing the rules).

   A. Incidental Motions
      1. Point of order (method used by a member to gain greater clarification on items of business).
      2. Appeal (prevents chairman from becoming a dictator).
      3. Suspend the rules (allows group to conduct business contrary to the rules of order or standing rules).
      4. Object to the consideration of a question (used to prevent undesirable main motions from becoming before the assembly).
      5. Division of the assembly (calls for a revote).
      6. Division of a question (divides a main motion in two parts so that it can be acted on separately).
      7. Method of nominating or voting (used to determine the way to nominate officers and vote).

8. Nominations (determines the method of nominations).
9. Point of information (method used by a member to gain greater clarification on item of business).
10. Parliamentary inquiry (used to obtain parliamentary information).

B. Motions That Bring A Question Before The Assembly
   1. Take from the table (considers a motion for the second time).
   2. Reconsider (allows the majority of the assembly to bring back a motion already acted upon).
   3. Rescind and amend something previously adopted (motions used to change an action previously taken. Rescind is a motion by which a motion that had been adopted can be canceled or annulled).

IV. Motivation

A. Films and filmstrips.
B. Attend business meetings of farm or other organizations to observe their proficiency in conducting a meeting.
C. Bulletin board displays.
D. Charts and transparencies relating to the use of parliamentary procedure.

V. Learning Activities

A. Compile a list of parliamentary terms, their meaning and how each is used.
B. Serve as a chairperson during a simulated meeting.
C. Prepare a written report of a committee meeting.
D. Deliver an oral report of a committee meeting.
E. Record minutes of a meeting and submit them to class members for their evaluation.
F. Compile a list of business organizations in the area, their offices and the duties associated with each office.
G. Introduce items of business, and participate in debate during simulated meetings.
H. Unit tests, lectures and discussions.
I. Team competition within the classroom.

VI. Materials Needed

A. Books, Bulletins and Pamphlets
   1. *A Guide to Parliamentary Practices.* Interstate.
   2. *Helps in Mastering Parliamentary Procedure.* Stewart. Coop Print Shop, New Concord, Ohio 53752.
   3. *The How In Parliamentary Procedure.* Russell. National Farm Book Company. 1967.
   4. *How To Hold a Better Meeting.* Snell. Harper and Brothers.
   5. *Leadership Training and Parliamentary Procedure for FFA.* Gray & Jackson, Prentice-Hall.
   6. *Mister/Madam Chairman.* Haugen. National Farm Book Company. 1963.
   7. Office Manual for Future Farmers of America. National FFA Supply Service, Alexandria, Virginia 22309.
   8. *Parliamentary Procedure.* Sturgis. McGraw-Hill Book Co.
   9. *Parliamentary Law At A Glance.* Utter. National Farm Book Company, 1953.
   10. *Practical Parliamentary Procedure.* Cruzan. McKnight and McKnight.
   11. *Roberts' Rules of Order.* Roberts. Interstate and National Farm Book Company. 1971.
   12. *Sturgis Standard Code of Parliamentary Procedure.* 2nd edition. McGraw-Hill Book Co.
   13. *Unit Course Outline in Parliamentary Procedure.* State FFA Executive Secretary, Department of Public Instruction, 125 S. Webster Street, Madison, Wisconsin 53702.
   14. "Parliamentary Procedure For The FFA Member" Joestgen, State FFA Executive Secretary, Dept. of Public Instruction, 125 S. Webster Street, Madison, Wis. 53702.
   15. "A Handbook For Conducting FFA Meetings" Russell, the Interstate Printers & Publishers, 1952.

B. Suggested Transparencies
   1. FFA meeting room.
   2. The different kinds of motions.
   3. The correct procedure for nominations.
   4. Ten basic rules of parliamentary procedure.
   5. Opening and closing ceremonies of the FFA.

6. A summary of motions showing the kind of motion, whether a second is required, whether it is debatable, whether it is amendable, what type of vote is required, and the purpose.

C. Suggested Charts
  1. The steps in making a motion, an amendment, and an amendment to the amendment.
  2. The correct order of business.

D. Suggested Films
  1. "Parliamentary Procedure." 2561. BAVI.
  2. "Parliamentary Procedures." 3624. BAVI.
  3. "Parliamentary Procedures in Action." 1627. BAVI.

PASTURE MANAGEMENT

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in plant science and pasture management and will be able to relate these factors to his/her own specific needs and aspirations.

B. Discuss the importance of pasture and pasture forage crops in Wisconsin.

C. List and discuss five advantages of a pasture.

D. Compare five common pasture forages.

E. Evaluate five common pasture crops found in Wisconsin.

F. Contrast methods of harvesting pastures.

G. Select the correct pasture crop for a given field situation.

H. Choose the practices necessary for establishing a pasture.

I. Describe the necessary steps in pasture renovation.

J. Explain five practices that reduce losses from winter killing.

K. Summarize three causes of nitrate poisoning.

L. Recall five precautions that must be taken to prevent bloat on pastures.

II. Concepts to Develop

A. There are career oportunities in plant science and pasture management for young men and women at all levels of educational preparation.

B. Forages harvested as pasturage provide the cheapest and most economical source of feed on the farm.

C. Mixtures of grasses and legumes are usually more productive than seedings of grasses or legumes alone.

D. Pastures can be kept productive if fertility needs are met and correct management practices are followed.

E. Pasture renovation is the establishment of superior grasses and legumes in thin unproductive sods of permanent pastures on hilly, erodable land without plowing.

F. Most forages used to provide pasturage deteriorate in feeding value as they approach maturity.

G. Yields of forage from grazed woodlands are very low and grazing by livestock eventually destroys the woods.

H. Grassland agriculture is a balanced system of farming designed to avoid waste of soil and fertility by erosion, and excessive plowing.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs
  2. Job description
  3. Training requirements
  4. Working conditions
  5. Opportunity for advancement
  6. Other factors related to student needs and aspirations.

B. Methods of harvesting pastures.
  1. Grazing.
    a. Rotational.
    b. Strip.
    c. Continuous.
  2. Green chop.
  3. Stored feeding.

C. Management practices and problems.
  1. Burning.
  2. Mowing.
  3. Bloat.
  4. Drought.
  5. Winter kill.
  6. Poisonous plants.
  7. Nitrate Poisoning.
  8. Insects
  9. Disease

D. Establishing forages for pastures.
  1. Seed bed preparation.
    a. Within the crop rotation.

    - b. Renovation of permanent pastures.
  - 2. Selection of plant varieties.
  - 3. Lime and fertilizers to use.
  - 4. Production goals desired.

IV. Motivation

- A. Field trip to view farm pastures & test plots
- B. Field trip to view pasture renovation.
- C. Bulletin board displays.
- D. Slides and films on pasture management.

V. Learning Activities

- A. Occupational experience programs.
- B. Renovate a small portion of a field.
- C. Collect and prepare a display of seeds.
- D. Prepare mounts of insects and diseases of pasture plants.
- E. Prepare displays and graphs depicting economics of good pasture management.
- F. Examine nutrient analysis taken of different pasture forages.
- G. Prepare charts and displays on poisonous plants, nitrate poisoning, and bloat.
- H. Develop a pasture improvement system for the student's home farm.

VI. Materials Needed

- A. Books
  - 1. Delorit and Ahlgren. *Crop Production.* Prentice Hall, 1973.
  - 2. Smith. *Forage Management.* Wm. C. Brown Book Co.
- B. Bulletins and Pamphlets
  - A1525 "Forage Crop Varieties." University of Wisconsin - Extension Bulletin Room.
  - "Pasture Renovation." Agronomy No. 18, Agriculture Extension, University of Minnesota, U.S. Dept. of Agriculture.
  - R2190 "Pasture Renovation in Southwestern Wisconsin," University of Wisconsin-Extension.
  - "Profitable Forage Production and Use." Rohweder. University of Wisconsin-Extension.
  - "Weed and Insect Control in Forage and Small Grain." University of Wisconsin-Extension.
  - A1250 Wisconsin Needs Better Pastures
  - A1119 Supplementary and Emergency Forage Crops.
- C. Films
  - 1. "Look to Ladino." Suite 424, Southern Building, 1425 H. Street, N.W. Washington, D.C.
  - 2. "Cash in on Grass." Midland Cooperative, Inc. 739 Johnson Street, N.E. Minneapolis, Minn.

PESTICIDES, AGRICULTURAL

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in pest control and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Read and interpret the terminology found on pesticide labels.
- C. Identify and discuss the need and importance of pest control on our American farms.
- D. List and discuss the significant highlights of the history and development of the agricultural chemical industry.
- E. List significant government legislation controlling the use and registration of agricultural pesticides.
- F. List the federal departments and agencies which are assigned to the regulation of pesticides.
- G. List the general groups of agricultural pests of most significance to the farmer.
- H. Use pesticides in a safe and prudent manner.
- I. Be familiar with the various chemical formulations for pesticides and the advantages and disadvantages of each.
- J. List the more important pesticides used in the students' area for the various crops grown.
- K. be familiar with the application equipment used in applying pesticides.
- L. Properly calibrate the equipment used in applying pesticides.
- M. List places that information can be obtained on the use, applications, and laws regarding agricultural chemicals.

II. Concepts to Develop

- A. There are career opportunities in pest control for young men and women at all levels of educational preparation.
- B. Pesticides contribute signifiantly to farm production.

C. Federal and state governments regulate the chemical industry.
D. Pests are destructive to crops.
E. Seletion of the right pesticide is important.
F. Each pesticide has its recommended method of application. Read the label.
G. Proper operation and care of application equipment include calibration.
H. Pesticides must be used safely. Read the Label.

III. Subject Matter to Teach

A. Careers and Related Occupations
   1. Current and future employment needs.
   2. Job descriptions.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

B. Common pests and importance of their control
   1. Insects.
   2. Plant and animal.
   3. Weeds.
   4. Rodents.

C. History of Pest Control
   1. Early development to present
      a. Cultural
      b. Chemical

D. Government regulations
   1. Departments of federal and state governments involved.
   2. Federal and state legislation.
   3. New pesticides and how they are introduced.

E. Rules for safe use of pesticides

F. Demonstration of pesticide formulations
   1. Materials needed.
   2. Pesticide formulations.

G. Common pesticides used in the area
   1. Crops.
   2. Animals.

H. Application Equipment
   1. Sprayer parts.
   2. Sprayer calibration.

I. Common terminology
   1. Types of applications.
   2. Types of chemical pesticides.
   3. Agricultural chemical terms.
   4. Labels of pesticide products.

IV. Motivation

A. Field trip to chemical field plots.
B. Chemical field man class presentation.
C. Film and slide series.
D. Bulletin board displays.
E. Knowledge requirements for certification as a pesticide applicator

V. Learning Activities

A. Occupational experience program.
B. Demonstrate chemical formulations.
C. Collect labels and other pesticide containers.
D. Discuss pesticides used on each student's farm.
E. Calibrate a field sprayer.
F. Collect various samples of sprayer parts

VI. Materials Needed

A. Books
   1. Frear. *Pesticide Handbook*. College Science Publishers. 1972.
   2. Isley, *Weed Identification and Control*. Iowa State University Press. 1962

B. Bulletins and Pamphlets
   1. "Agricultural Chemicals" — Manufacturing Chemists' Association.
   2. "Our Struggle Against Pests" — U. S. Department of Agriculture. 1967.
   3. "Spray Application Guide" — Geigy Agricultural Chemicals.
   4. "Pesticide Lesson Plans for Vocational/Agriculture" — Geigy Agricultural Chemicals.
   5. "Pesticide Terminology-Definition of Terms", Food and Drug Administration, Dept. of HEW.
   6. "Weed Control-Cultural and Chemical". Dept. of Agricultural Education, Ohio State University
   7. "Agricultural Chemical Safety." Vocational Education Productions, California State Polytechnic College, San Luis Obispo, California.

C. Films and Filmstrips
   The following are available from BAVI:
   1. "Chemical Conquest" — 1905
   2. "Let's Look at Weeds" — 3138
   3. "Pests or Plenty" — 1572
   4. "Safe Use of Pesticides" — 5688
   5. "Who Shall Reap" — 4383
   6. "Instructions and Obstructions" — 6121
   7. "Poisoned Planet" — 7907

D. Teaching Aids
   1. Field Crops Herbicide Handbook for Dealers and Custom Applicators, U.W.-Extension
   2. Agriculture Cooperative Training Guide - Agriculture Chemicals Employee

E. Transparencies
   1. "Weed Identification" - Vocational Agriculture Service, Urbana, Illinois

2. “Weed Control” - Vocational Agriculture Service, Urbana, Illinois
3. “Weed Control” - Agriculture Education Service, Ohio State University

PLANT GROWTH

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Classify common agricultural plants as monocotyledonous or dicotyledonous plants.
- B. Draw and label the parts of both the corn and the bean seed.
- C. Conduct and evaluate a germination test.
- D. Demonstrate the process of osmosis.
- E. Explain the chemical changes that take place during photosynthesis.
- F. Discuss the requirements which must be met if the process of photosynthesis is to occur.
- G. Write and explain the chemical formula for the process of respiration.
- H. Discuss the importance of respiration in plant growth.
- I. Draw and label the parts of a complete flower.
- J. Explain the process of fertilization in plants.
- K. Apply the methods of plant propagation.
- L. Explain the function of a cell.
- M. List the basic parts of a cell.
- N. Explain the function of roots and the different types.
- O. Explain the function of stems and the different types.
- P. Discuss the various leaf arrangements.
- Q. Distinguish between the xylem and the phloem.
- R. List the major elements required by plants.
- S. Explain the process of transpiration.
- T. Be aware of the damage caused by polutants.
- U. List the five types of microorganisms which cause diseases.
- V. List careers dealing with plant growth.

II. Concepts to Develop

- A. There are career opportunities in plant science for young men and women at all levels of educational preparation.
- B. Seed vitality decreases with time.
- C. The life cycle of a plant begins with the seed.
- D. Large seeds can be planted more deeply than small seeds.
- E. Plant cells contain plastids which are not found in animal cells.
- F. Legumes can utilize nitrogen from the air.
- G. The process of respiration is continuous day and night as long as the plant remains alive.
- H. Considerable variation exists among different species of plants in the amount of water required for normal growth.
- I. The water requirement of individual crop plants is greatly influenced by prevailing climatic conditions.
- J. Plants grown on fertile soil use water more efficiently than those grown on poor soil.
- K. Plants weakened by insects and disease are less efficient in their use of water.
- L. Sixteen elements are required for plant growth.
- M. Most crops are dependent on seed for reproduction.
- N. Although flowers contribute much to the beauty and enjoyment of life, they are of even greater importance because of the seed they produce.
- O. Pollination is accomplished in several ways.
- P. Some plants are sterile to their own pollen and are dependent on insects for cross pollination and for the production of good yields.
- Q. The time required to accomplish fertilization after the flower has been pollinated varies from less than an hour to over a day.
- R. The root system of a mature plant may occupy a volume of space underground which is as large or larger than that occupied by the plant above ground.
- S. The stem gives the plant its height and supports the branches, leaves, flowers, seeds, or fruit.
- T. Leaves have three basic arrangements, alternate, opposite, and whorled.
- U. The xylem carries the water up the stem, the phloem carries the nutrients down from the leaves to the lower parts of the plant.
- V. Plants can be classified as either an annual, biennial, or a perennial.
- W. Plants are affected by air pollution.
- X. Diseases are caused by five types of microorganisms.

III. Subject Matter to Teach

- A. Careers in plant Growth.
  - 1. Career opportunities in plant science.

2. Job description, training requirements, working conditions, opportunities for advancement.

B. Seed
   1. Main parts.
   2. The endosperm.

C. Germination
   1. Conditions needed for it to happen.
   2. Steps or changes which take place during the process.
   3. Location of the root, hypocotyl, and epicotyl.
   4. Stages in the germination and emergence of a bean plant.
   5. Define node and internode.
   6. Location of the food supply in seeds.
   7. Crops having an active hypocotyl.
   8. Crops having an inactive hypocotyl.

D. How Plants manufacture their foods
   1. Define photosynthesis.
   2. Conditions necessary for the process of photosynthesis to take place.
   3. Types of chlorophyll.
   4. Raw materials.
   5. Manufactured product.
   6. By-product of the process.
   7. Stages of photosynthesis.

E. Plant nutrients
   1. Define a plant nutrient, an element.
   2. Elements necessary for normal plant growth.
   3. The process of diffusion.
   4. The process of osmosis.
   5. Movement of nutrients within the plant.

F. Respiration
   1. Chemical reactions involved in the process.
   2. Respiration in higher forms of plant life.
   3. Surplus foods.

G. Water
   1. Its functions in the life of a plant.
   2. Meaning of the term "water requirement."
   3. Amount required by different species.
   4. The process of transpiration.
   5. Factors affecting the water requirement of plants.

H. Reproduction of Plants
   1. Methods of reproduction.
   2. Components of a complete flower.
   3. Characteristics and functions of the flower components.
   4. The similarities and differences of flowers.
   5. The production of pollen and its function.
   6. The proess of pollination, self pollination and cross pollination.
   7. Steps or stages which take place from the time of pollination to fertilization.
   8. Define fertilization.

I. The composition of plants
   1. The make-up of plant cells.
   2. The purpose of plant roots.
   3. The types of plant roots.
   4. The purpose of plant stems.
   5. The difference between a herbaceous and a woody stem.
   6. The purpose of plant leaves.
   7. The different types of leaves.
   8. The three main leaf arrangements.
   9. The purpose of the xylem and the phloem.

J. Longevity of plants
   1. Annuals
   2. Biennials
   3. Perennials

K. Effects of air pollutants on plants
   1. The extent of the problem.
   2. Different types of pollutants and their symptoms.

L. Plant diseases and causes.
   1. Five types of microorganisms which cause diseases.
   2. Conditions favorable for diseases.
   3. Control of diseases.

M. Classifications of plants
   1. Need for classification.
   2. Development of the present classification system.
   3. Common and scientific names
   4. Important families of agricultural plants.
   5. Agricultural crops belonging to the gramineae family.

IV. Motivation

A. Bulletin board displays.
B. Films, filmstrips, slides and transparencies relating to plant growth.
C. Models showing parts of a flower.
D. Field trips to farms, gardens, or greenhouses to observe growing plants.
E. Guest speakers as County Horticulture Agent, greenhouse manager or operator.

V. Learning Activities

A. Occupational experience programs.
B. Collect and prepare a display of common crop seeds.
C. Conduct experiments on seed germinaton, osmosis, and diffusion.

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D. Dissect corn and bean seeds and identify their parts.
E. Collect and identify the different kinds of flowers and their parts.
F. Classify plants grown in the community.
G. Classify plants found in pictures and films.

VI. Materials Needed

A. Books
  1. Aldrich. *Modern Corn Production.* S & A Publications. Station A, Box 2660, Champaign, Ill. 61820.
  2. Aldrich. *Modern Soybean Production.* S & A Publications.
  3. Delorit, Greub, Ahlgren, *Crop Production.* Prentice-Hall, Inc., Englewood Cliffs, N. J.

B. Films

The following films are available from BAVI — University of Wisconsin, Madison.

"Biology: Photosynthesis," 5553
"Flowering Plants and Their Parts," 6558
"Food From the Sun," 6472
"Garden Plants and How They Grow," 2956
"How Plants Reproduce," 4105
"Learning About Leaves," 4795
"Plant Growth," 1702
"Plants That Grow From Leaves, Stems and Roots," 5203
"Roots of Plants," 1879
"What Plants Need for Growth," 5117

C. Bulletins

U. W. Extension A1628
Determining Crop Moisture Content

POLLUTION

I. Performance Objectives

Upon completion of this unit, the student will be able to:

A. Demonstrate an understanding of the natural processes of the atmosphere by describing:
  1. Air
  2. Radiation
  3. Conduction
  4. Convection
  5. Winds
  6. Inversion

B. List five sources of air pollutants and describe their affects on the environment.
C. Describe the physical, chemical and radioactive properties of six pollutants.
D. Demonstrate the ability to express concentrations of smoke density, suspended particulates, dust fall and radioactive material.
E. Describe the use of planned industrial site selection and zoning for maintaining the quality of air.
F. List and describe six types of air pollution control equipment.
G. Describe three natural ways to control air pollution.
H. Test the oxygen content of a given pond or stream to an accuracy of two parts per million.
I. Test pH of water in a pond or stream to within one pH level of accuracy.
J. Test water temperature of lake or pond with accuracy within three degrees.
K. Develop a complete written management plan for a designated stream, lake or pond considering:
  1. Oxygen supply
  2. Controlling undesirable fishes, snakes and frogs
  3. Controlling weeds, disease and parasites
  4. Preventing runoff from fields, streams and barnyards
  5. Preventing pollution by livestock pasturing practices

II. Concepts to Develop

A. There are career opportunities in pollution control for young men and women at all levels of educational preparation.
B. With the present commitment to environmental improvement there is likely to be rapid change in previous employment trends in natural resources occupations.
C. Pollution has had an affect upon the quality of air and water in Wisconsin.
D. Demands upon natural resources are growing at a tremendous rate.
E. Water conservation management will become more important and more people will have to help with the task of managing the water.
F. Business and industry are reacting to the public demands for environmental improvement and are developing programs to reduce pollution of air and water.
G. Pollution controls should be a concern of all citizens as well as business, industry and agriculture.
H. An understanding of the causes of pollution are necessary before corrective measures may be taken.

- I. The affects of pollution require correction over a long period of time and the cooperation of all involved.
- J. People can lead more stimulating and sensitive personal lives through environmental appreciation and understanding of what is required to create an atmosphere that allows business, industry and agriculture to effectively funtion without polluting our water and air supply.

III. Subject Matter to Teach

- A. Careers
  - 1. Current and future employment needs
  - 2. Job descriptions
  - 3. Training requirements
  - 4. Working conditions
  - 5. Opportunities for advancement
  - 6. Other factors leading to student needs and aspirations
- B. Sources of Pollutants
  - 1. Industry
  - 2. Municipalities
  - 3. Individuals
  - 4. Internal combustion engines
  - 5. Agriculture
- C. Physical properties
  - 1. Particulates
    - a. Size
    - b. Prevalence
    - c. Properties
  - 2. Gases
- D. Chemical properties
  - 1. Sulfur
    - a. Sulfur dioxide
    - b. Hydrogen sulfite
  - 2. Carbon
    - a. Carbon monoxide
    - b. Carbon dioxide
    - c. Soot
  - 3. Hydrocarbons
    - a. Olefins
    - b. Aromatics
  - 4. Nitrogen
    - a. Nitric oxide
    - b. Nitrogen dioxide
  - 5. Fluorine
  - 6. Ozone
  - 7. Other pollutants
    - a. Lead
    - b. Beryllium
    - c. Arsenic
    - d. Asbestos
    - e. Radioactivity
      - 1) Nature of radioactivity
        - a) alpha rays
        - b) beta rays
        - c) gamma rays
      - 2) Isotopes
      - 3) Ionization
      - 4) Sources of radioactivity
      - 5) Affects of radioactivity
- E. Expressing Concentration of Pollutants
  - 1. Smoke density
  - 2. Particulates suspended
  - 3. Dust fall
  - 4. Radioactive materials
  - 5. Gases
- F. Affects of air pollution
  - 1. Health of humans and animals
  - 2. Visibility
  - 3. Climate
  - 4. Vegetation
  - 5. Economic aspects
  - 6. Materials
- G. Maintaining air quality
  - 1. Site selection and zoning
    - a. Planning and land use
    - b. Zoning ordinance
    - c. Large air pollution zoning jurisdictions
    - d. Inner state compacts
    - e. International agreements
    - f. Plant locations
  - 2. Controlling air pollution
    - a. Process change
      - 1) Substitution of raw materials or fuels
      - 2) Modification of equipment
      - 3) Improvement of operating procedures
    - b. Application of control equipment
      - 1) Gravity settling chambers
      - 2) Inertial separaters
      - 3) Cyclone separaters
      - 4) Filters
      - 5) Electrostatic precipitators
      - 6) Scrubbers
      - 7) Incinerators
- H. Sources of water
  - 1. Rainwater
    - a. Area required; roof, others
    - b. Storage required
    - c. Cisterns
  - 2. Surface water supplies
    - a. Ponds and lakes
    - b. Rivers
    - c. Ground water supplies
      - 1) Springs
      - 2) Shallow wells
      - 3) Deep wells
      - 4) Artesian wells
      - 5) Infiltration galleries
      - 6) Filter crib and flooded areas
- I. Demand for water
  - 1. Agriculture

2. Domestic
3. Industrial
4. Fire demand
5. Demand factors
    a. Living standards
    b. Climate
    c. Quality
    d. Size of city

J. Water shed protection
1. Wastewater pollution
    a. Domestic
    b. Industrial
2. Recreation
3. Erosion

K. Evaluating water quality
1. Potability
    a. Microorganisms
    b. Taste
    c. Odor
    d. Other
2. Chemical
    a. Calcium
    b. Magnesium
    c. Iron
    d. Manganese
    e. Sulfur
    f. Carbon dioxide
    g. Methane
3. Physical
    a. Hardness
    b. Corrosiveness
    c. Color
4. Manufactured pollutants
    a. Phenols
    b. Metal wastes
    c. Acids
5. Natural pollutants
    a. Fluorides
    b. Phosphates
    c. Manganese
    d. Iron
    e. Nitrates

L. Water treatment
1. Plain sedimentation
2. Aeration
3. Sand filter
4. Coagulation
5. Storage sedimentation
6. Chlorination
7. Softening
8. Stabilization
9. Fluoridation
10. Corrosion control
11. Algae control
12. Taste and odor control
13. Demineralization

IV. Suggested Learning Activities

A. Survey local community and list possible sources of air pollution.

B. Take field trip to industry to observe pollution control devices in action.

C. Have representative of tuberculosis or respiratory association give talks on the effects of air pollution on man and animals.

D. Take field trip to a garage and have a mechanic demonstrate the function of emission control devices on automobiles.

E. Examine typical air pollution data to become familiar with the terms for expressing concentration of pollutants.

F. Examine vegetation observing the affects of concentration of air pollutants.

G. Locate the three largest users of water in the community and determine their daily water requirements.

H. Determine the average inches of rainfall in an acre area and convert it into gallons.

I. Set up a rain gauge and keep a daily record of rainfall for the duration of the module.

J. Locate the permanent rainfall checkpoints and area and determine the rainfall distribution pattern.

K. Set up a classroom demonstration using various size containers for the water and observe loss by evaporation.

L. Set up a demonstration using sweet potatoes in containers of water to show loss through transpiration.

M. Use a water pollution detection kit and determine alkalinity, ammonia, calcium, carbon dioxide, chloride, chlorine, chromium, copper, cyanide, dissolved solids, iron, magnesium, nitrates, phosphates, selenates and sulfer content of the water samples collected in the community.

N. Practice determining the hardness of fresh water supplies.

O. Practice determining the pH of fresh water supplies.

P. Set up a classroom demonstration of water in containers and run periodic bacteria counts.

Q. Take a field trip to a water shed and locate possible pollution sources in the area.

R. Collect samples of water for testing.

S. Take a field trip to a water testing laboratory.

T. Interpret laboratory water tests.

U. Have public health person speak on the importance of palatable water to individual self.

V. References

A. Books

1. Air Pollution Control Association, *Air Pollution Experiments for Junior and Senior High School Classes.*
2. Barker and others, *Air Pollution.*
3. Corman, *Air Pollution Primer.*
4. Fair and Geyer, *Elements of Water Supply and Wastewater Disposal.*
5. Hardenbergh and Rodie, *Water Supply and Waste Disposal.*
6. Stern, *Air Pollution,* Volume I, II, III.
7. Youth Department of Health, Education and Welfare, *Water and Wastewater Technology,* suggested two-year post high school curriculum.

POULTRY PRODUCTION

I. Performance Objectives

Upon completion of this unit the student will be able to

A. Identify the career opportunities associated with the poultry industry and describe briefly the background and training contributing to success in these careers.
B. Utilize published random sample test results in selecting a strain or variety of poultry.
C. Distinguish a laying hen from one that is not in production.
D. Identify the parts of the various body systems from drawings or actual specimens, and explain their function.
E. Describe the development of the embryo chick and indicate the management and hatchery factors influencing hatchability.
F. Outline a management program (feeding, housing, disease and parasite control) for growing broilers and replacement pullets.
G. Outline a management program (as in item F, above) for the laying flock.
H. List the market grades of poultry meat and eggs and explain or illustrate the factors determining these grades.
I. List the commercially important breeds, the market classes, and the specific management practices associated with the production of turkeys for meat.
J. List and discuss briefly at least two species of poultry other than chickens and turkeys.
K. List, or indicate on maps, the significantly important poultry producing states and the important counties in Wisconsin.

II. Concepts to Develop

A. The poultry industry provides career opportunities for young men and women at all levels of educational preparation.
B. The sale of poultry and poultry products is an important source of farm income both nationally and in Wisconsin.
C. The poultry industry can be divided into commercial and farm flock production and into chickens and other poultry species.
D. The physical nature of the avian species makes management of poultry more critical than for most other farm animals.
E. Quality poultry products compete effectively with other livestock products for the consumer's dollar.

III. Subject Matter to Teach

A. Distribution and Economic Importance
    1. Importance of the poultry industry
    2. Distribution of poultry
    3. Career opportunities
B. Selection and Random Sample Testing
    1. Standard classification of breeds and varieties
    2. Choosing a variety or strain
    3. Random sample testing
    4. How to analyze test results
    5. Other factors to consider
    6. Culling the laying flock
C. Body Systems and Functions
    1. General description
    2. The exoskeleton
    3. The skeletal system
    4. The muscular system
    5. The digestive system
    6. The respiratory system
    7. The urinary system
    8. The reproductive system
    9. Other body systems
D. Incubation and Hatching
    1. Development of the embryo
    2. Factors influencing hatchability
    3. Hatchery management
E. Flock Management
    1. Brooding and rearing broilers and replacement pullets
        a. 0-8 weeks
        b. 9-22 weeks

        2. Laying flock management
        3. Housing principles
    F. Feeding Principles and Practices
        1. The essential nutrients (Review)
        2. Feed additives
        3. Metabolic processes
        4. Sources of poultry feedstuffs
        5. Poultry rations
    G. Poultry Diseases and Parasites
        1. Classification of poultry diseases
        2. Disease control measures
        3. Management and prevention
    H. Marketing Poultry Products
        1. Marketing eggs
        2. Marketing poultry meat
    I. Other Poultry Enterprises
        1. The poultry meat industry
            a. Turkeys
            b. Broilers (chicken)
        2. Other Poultry

IV. Motivation

A. Field trip to hatchery.
B. Educational film on the development of embryo chick.
C. Field trip to commercial pullet rearing or broiler growing operation.
D. Field trip to commercial and/or farm laying flock.
E. Field trip to egg and/or poultry meat processing plant.

V. Learning Activities

A. Students S.O.E.P.
B. Brooder in classroom or shop.
C. Egg grading demonstration
D. Poultry dressing and grading
E. Post mortem examination
F. Debeaking demonstration
G. Laying hen culling demonstration

VI. Materials Needed

A. Books
    1. Bundy & Diggins, *Poultry Production*, Prentice Hall, 1972
    2. Ensminger, *Poultry Science*, Interstate, 6th Edition. 1971
    3. The American Poultry Association, Inc., *Standard of Perfection*, Interstate, 1973.
B. Bulletins and Pamphlets
    1. Skinner, Brevik, Bunde, and Hall, *The Laying Flock*, U. of Wisconsin-Extension.
    2. *Approved Practices for Pullet Growing*, Agdex 450/12, A Student Manual, 1978 Pennsylvania State University, Ag. Ed. Dept., 16802. Others in Approved Practices Series are:
        a) Poultry Meat Agdex 450/12
        b) Laying Hens Agdex 450/12
        c) Turkeys Agdex 453/12
    3. *Wisconsin Agricultural Statistics*, Wisonsin Department of Agriculture, Trade and Consumer Protection.
    4. *Poultry and Egg Situation*, U.S.D.A.
    5. *From Egg to Chick*, University of Illinois, College of Agriculture, Cooperative Extension Service.
C. Films and Filmstrips
    1. *Development of the Chick*, Film, UWEX, BAVI Madison, WI.
    2. Poultry Brooding Management, Filmstrip, Vocational Education Productions, Calif. Polytechnic State Univ., San Luis Obispo, CA 93407
    3. *Poultry Selection and Judging*, Filmstrip, Vocational Education Productions. California Polytechnic Institute, San Luis Obispo, CA, 93407

SAFETY IN AGRICULTURE

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Develop a positive attitude toward the philosophy of safety.
B. Develop a philosophy that safety must be practiced everywhere all the time.
C. Identify potential hazards in agribusiness occupations and determine means for their elimination.

II. Concepts to Develop

A. Safety has been a part of national program planning from the beginning of our own country, and has contributed to its success and greatness today. Likewise, it would be a part of intelligent planning to include safety in success of any agricultural or other activity.
B. A constant awareness of safety is needed by all persons at all times.
C. A body of knowledge enables a person to recognize unsafe conditions and situations which contribute to accidents.
D. Safety practices should be a vital part of all community programs.
E. Continuous evaluation of safety programs are needed and adjustments made based on current and future needs.
F. All persons need to comprehend the gravity of accidents and the alternatives facing potential victims.

G. Students need to relate the nature of the accident to the kind of equipment being operated or activity engaged in.

III. Subject Matter to Teach

A. The need to observe safety at all times
   1. Farm tractor operation.
   2. Safe farm machinery operation.
   3. Farm shop.
   4. Farm home and buildings.
   5. Farm fire prevention.
   6. Rural traffic and transportation.
   7. Agricultural chemicals.
   8. Electricity.
   9. Livestock.
   10. Recreation.
   11. Natural disasters.

IV. Motivation

A. Field trip to farm.
B. Field trip to machine dealer.
C. Field trip to machine manufacturer.
D. Interview with an accident victim.
E. Demonstration by fire department.
F. Presentation by insurance representative.
G. Bulletin boards.
H. Mass media—newspaper, radio, T.V.
I. Law enforcement and traffic control personnel speak to class.
J. Bring in physician for an illustrated talk.
K. Tractor roll-over demonstration.
L. Attendance at safety seminars.
M. Survey the safety needs of your own community.

V. Learning Activities

A. Farm and home inspection program.
B. Elementary school, safety program.
C. Tractor operator contest.
D. Demonstrations.
E. Prepare an exhibit.
F. Demonstrate hearing protection equipment.
G. Demonstrate hard hats and their role in saving lives.
H. Demonstrate the use of fire extinguishers.
I. Students demonstrate small machine safety.
J. Participation in state and national safety programs.

VI. Materials Needed

A. Books
   1. Jones. *Shop Work On The Farm* National Farm Book Co. 1955.
   2. Luening & Mortenson. *Farm Management Handbook*. National Farm Book Co. 5th Ed., 1972.
   3. Phipps. Mechanics in Agriculture. National Farm Book Co. 1977.
   4. Wakeman & McCoy. *Farm Shop*. National Farm Book Co. 1960.

B. Bulletins and Pamphlets
   1. "A Guide for Implementing The Federal Hazardous Ocupations Order." Wisconsin Department of Public Instruction, 125 S. Webster Street, Madison, WI.
   2. "Farm and Home Safety Inspection Report." A2374. University of Wisconsin-Extension.
   3. "Farm Field Machinery." Finner, American Printing and Publishing Corp., 2909 Syene Road, Madison Wisonsin 53713.
   4. "Farm Safety Handbook." Wisconsin Public Service Commission.
   5. "Farm Safety Lessons." Jensen. Agriculture Engineering Dept., University of Wisconsin, Madison.
   6. "Farm Safety Review." National Safety Council, Chicago, Illinois.
   7. "Fatal Farm Accidents in Wisconsin." University of Wisconsin-Extension.
   8. "FFA At Work For Safety." National FFA Supply Service. Alexandria, Virginia.
   9. "Fire Extinguishers For Farm and Home." Cir. 666. University of Wisconsin-Extension.
   10. "Frequent Questions About the Occupational Safety and Health Act." University of Wisconsin-Extension.
   11. "Hand Signals For Agriculture." A2478. University of Wisconsin-Extension.
   12. "National FFA Chapter Safety Award Handbook." National FFA Supply Service.
   13. "Plan to Meet Emergencies." Cir. 632. University of Wisconsin-Extension.
   14. "Protect Your Hearing." University of Wisconsin-Extension.
   15. "Resource Unit for Teaching Safe Farm Machinery Operation." Agriculture Engineering Dept., University of Wisconsin, Madison or the Dept. of Agricultural Engineering, University of Minnesota.

16. "Resource Unit for Teaching Safe Tractor Operation." Agriculture Engineering Dept., University of Wisconsin, Madison, or the Dept. of Agricultural Engineering, University of Minnesota.
17. "Rural Accident Prevention Bulletin." National Safety Council, Farm Department, 425 N. Michigan Ave., Chicago, Illinois 60611.
18. "Rural Wisconsin Accidents." A2375. University of Wisconsin-Extension. 1978
19. "Safe Use and Storage of Flammable Liquids." FB2156. University of Wisconsin-Extension.
20. "Safeguard Your Farm Against Fire." FB2150. University of Wisconsin-Extension.
21. "Slow Moving Vehicle Emblem." Special Cir. No. 123, University of Wisconsin-Extension.
22. "Tornado! How To Protect Your Home and Family." Cir. 584. University of Wisconsin-Extension.
23. "Watch Your Step — Avoid Farm Accidents." FB 2101. University of Wisconsin-Extension.

C. Films, Filmstrips and Slides

Home

1. "Electrical Hazards in the Home." D. V. Jensen. Agricultural Engineering Dept., University of Wisconsin, 460 Henry Mall, Madison, WI 53706.
2. "Falls Aren't Funny." D. V. Jensen.
3. "How to Have a Family Home Fire Drill." D. V. Jensen.
4. "The Facts of Fire." D. V. Jensen.

Machinery

1. "Miscues With Machines." D. V. Jensen.
2. "Operating Farm Tractors & Machinery Efficiently and Safely." D. V. Jensen.
3. "Quick Identification Improves Road Safety on Farm Vehicles. D. V. Jensen.
4. "Tractor Tragedy." D. V. Jensen.
5. "Within the Frame of Safety." D. V. Jensen.
6. "Your Rural Road Challenge." Slides and script. D. V. Jensen.

Others

1. "Anhydrous Ammonia and Your Safety." The Fertilizer Institute.
2. "Awards Program for Youth Organizations." D. V. Jensen.
3. "Chance of a Lifetime." 7577. BAVI.
4. "Emergency Preparedness Information Card." EP-3. D. V. Jensen.
5. "Farm Petroleum Safety." Petroleum Council, 25 W. Main St., Madison, WI.
6. "Farm Safety Week," Packets. D. V. Jensen.
7. "Farm Tractor Safety." Petroleum Council.
8. "Gasoline Storage Demonstration." D. V. Jensen.
9. "Handle With Care." National Agriculture Chemical Association, 1155 15th Street, N. W., Washington, D. C. 20005.
10. "Handling Livestock Safely." USDA, Washington, D. .
11. "He's Deaf—You're Blind." Ag-Tronic, Inc., P.O. Box 1106 Hastings, Nebraska. 68901.
12. "Mow in Safety." D. V. Jensen.
13. "Pesticide Safety on the Farm." D. V. Jensen.
14. "Planning for Emergencies." D. V. Jensen.
15. "Poison Perils." D. V. Jensen.
16. "Protecting Livestock From Radio-active Fallout." D. V. Jensen.
17. "Safe Storage and Use of Flammable Liquids." D. V. Jensen.
18. "Safety Lessons for High School Teachers and Students." D. V. Jensen.
19. "What Do You Fall For?" D. V. Jensen.
20. "Year of Double Trouble." D. V. Jensen.

D. Other Sources of Health and Safety Films and Information.

1. Bureau of Highway [illegible] W. Wilson St., [illegible] State Office Building, Madison, WI 53702.
2. J. I. Case Company, 700 State Street, Racine, WI 53404.
3. Division of Health, Wisconsin Dept. of Health and Social Servies, Box 309, Madison, WI 53701.
4. Employers Insurance, Wausau, WI.
5. Farm Film Foundation, Washington, D. C.
6. Fifth U. S. Army, Central Audio Visual Center, Camp McCoy, Sparta, WI.
7. General Motors, Public Relations Dept., 3044 Grand Blvd., Detroit, MI.
8. Ideal Pictures, 4431 W. North Ave., Milwaukee, WI 53208.
9. International Harvestor Co., 2572 University Ave., St. Paul, MN.

10. National Association Automotive Mutual Insurance, Co., 20 N. Waker Dr., Chicago, IL.
11. National Commission on Safety Education, 1201 16th St., N. W., Washington, D. C.
12. National Fire Protection Association, 60 Battery March St., Boston, MA.
13. National Safety Council, 425 N. Michigan Ave., Chicago, IL.
14. Wisconsin Council on Safety, 111 E. Wisconsin Ave., Suite 1600, Milwaukee, WI 53202.
15. Wisconsin Public Service Corporation, Film Library, 600 N. Adams St., P.O. Box 700, Green Bay, WI 54301.
16. Wisconsin Telephone Company, Consumer Relations Dept., 740 N. Broadway, Milwaukee, WI 53202.

E. Periodicals
  1. *Farm Safety Review.* National Safety Council, Chicago, IL.

SALES AND SERVICES, AGRICULTURE

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in agricultural sales and services and will be able to relate these factors to his/her own specific needs and aspirations.

B. Discuss and prepare a comparison chart on the four forms of business in the American free-enterprise system.
  1. Sole proprietorships
  2. Partnerships
  3. Corporations
  4. Cooperatives

C. Understand the values, interests, aptitudes, attitudes, and personal abilities required by his/her employer.

D. Write a letter of application, including a personal data sheet, to an employer of his choice.

E. Conduct a personal interview with a prospective employer.

F. Fill out correctly at least three different job appliation forms for employment.

G. Write a minimum of 200 words how sales and services relate to and its importance to our American economy.

H. Prepare a written outline and give an oral report of at least three minutes which illustrates the desirable qualities of a successful salesperson and/or service person.

I. Converse with another student on a selected topic for a pre-determined length of time.

J. Demonstrate correct telephone procedures and techniques.

K. Demonstrate proper techniques and procedures to use in a customer approach.

L. Demonstrate how a product and/or service should be presented to the customer.

M. List five reasons why potential customers resist buying and explain how to overcome each.

N. To close a sale. After hearing an oral sales presentation in the classroom, the student will discuss orally the point at which the close was initiated, and the methods used in its accomplishment.

O. Correctly complete at least ten sales tickets which includes entries, sales tax, and discounts if applicable.

P. Use ten correctly completed sales tickets, and without an error, make correct change for the amount of money presented.

Q. Write ten checks correctly, and understand the various types of endorsements, and how to scrutinize a check to see if they are O.K. to be accepted or cashed.

R. Identify, complete and explain the purposes of at least ten inventory forms, business invoices, packing slips, and bills of lading.

S. Determine the selling price of at least ten items using the various systems to determine mark-ups to arrive at the selling price.

T. Compute the cost of credit on at least ten items, filling in time-payment forms, and determine whether or not a customer is eligible for credit.

U. Prepare an attractive display of selected agricultural products.

V. Identify and evaluate the various fringe benefits offered by at least three different employers.

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II. Concepts to Develop

A. There are career opportunities in agricultural sales and service for young men and women at all levels of educational preparation.

B. Post-high school training in agricultural sales and service is available in Wisconsin at several vocational technical schools and at three of our universities.

C. There are four ways of doing business in America and they all have several identifiable characteristics.

D. Employers have certain expectations, rules, regulations, etc., concerning their employees.

E. A properly written letter of application entails a great deal of thought, good grammer, interest and neatness.

F. Mental preparation, good grooming, promptness, attentiveness, good grammar usage, and interest are all important ingredients for a successful personal interview.

G. Neatness, accuracy, and the truth are of great importance in filling out an application blank for employment.

H. The sale of an item or items is of mutual benefit to both the salesperson and the customer.

I. Our economic system is dependent upon sales.

J. Salespersons must exhibit sincerity, dependability, integrity, loyalty, imagination, enthusiasm, courtesy and tact.

K. The only way confidence may be built up by a good salesperson is to practice and put to use good grammar, good voice tone, imagination, and pertinent and informative thinking.

L. Much business is transacted by the use of the telephone; therefore the user must know and accomplish the proper methods and usage of the telephone by speaking clearly, positively identify the person to whom he/she is speaking, and to accurately take down in writing what is to be accomplished.

M. All customers are different; therefore, different techniques need to be acquired and used. The salesperson has to know how to display enthusiasm, interest, ask questions, and answer questions, and how to handle negative attitudes and faultfinding.

N. One must develop the customer's interest in the product, cultivate his desire for the product, and relate the product to the customer's need.

O. Customers often offer resistance to buying because of price, quality, and style. A good salesperson must learn techniques to overcome their resistance.

P. In order to close a sale, the salesperson must obtain the customer's full attention and confidence.

Q. Sales tickets must be filled out accurately.

R. Making change must be done with 100% accuracy.

S. Checks and credit cards are a common method of paying for purchases.

T. Inventory forms, business invoices, packing slips, and bills of lading are important pieces of information and are used for various reasons.

U. There are various methods used to set selling prices of products above cost.

V. A substantial percentage of purchases are made via the use of credit; therefore a salesperson has to become well versed in figuring costs of credit by the various methods.

W. Attractive displays of products are appealing to the eye and lead to increased sales.

X. Fringe benefits should be fully understood, because they may be of greater importance than the initial salary or wage offered.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

B. Vocational technical schools and universities in Wisconsin providing education in agricultural sales and services.

C. How American businesses are organized.

D. Human relations — employee-employer relations.

E. Characteristics of a salesperson and/or serviceperson.

F. Agricultural selling — agricultural service.

G. Mathematical calculations.

H. Determining selling prices.

I. Proper use of the telephone.

J. Store skills and procedures.

K. Meeting the customer.

L. Presenting merchandise and services to the customer.

M. How to close a sale.

N. Computing sales tickets.
O. Operation of adding machines — calculators.
P. Operation of a cash register — checking out at the end of the day.
Q. Handling money — checks — credit cards — making change.
R. Use of credit and contracts.
S. Merchandising — stocking — displaying.
T. How to find a job.
U. How to apply for a job.
V. Letters of application — data sheets.
W. Filling in job application forms.
X. Personal interviews.
Y. Securing work permits and social security cards.
Z. Unions — professional organizations — fringe benefits.

IV. Motivation

A. Field trips to various agribusinesses.
B. Guest speakers.
C. Charts, pictures, etc. on agricultural sales and services.
D. Bulletin board displays.
E. Merchandise displays put up by students.
F. Films, filmstrips, slides.

V. Learning Activities

A. Place students in centers for occupational experience.
B. Role-playing by students.
C. "Mock" store set-up whereby all students gain business experience
D. Provide cooperative education program.
E. Utilize a shadow program in actual jobs.

VI. Materials Needed

A. Books, Bulletins and Pamphlets
    1. Resource Unit Agriculture — "Sales and Service." This booklet contains 117 sources of information in this unit.
    This booklet was developed by Vocational Agriculture Pilot Program Workshop — Wisconsn State University - River Falls, Wisconsin, July, 1971.
    Published by the Bureau for Vocational Education, State Department of Public Instruction, 125 S. Webster St., Madison Wisconsin 53702.
B. Instructional Media
    1. Bills of lading.
    2. Cash register.
    3. Check blanks.
    4. Daily business forms.
    5. Inventory forms.
    6. Loan forms — time payment forms.
    7. Packing slips.
    8. Sales tickets.
    9. Scales.
    10. Supplies to set up a "mock" store.
    11. Toy money (like used in primary grades).
    12. Visuals of all types.
C. Films
    1. "Customer and You: Get Organized." 7171. BAVI.
    2. "Customer and You: Getting the Decisions." 7170 BAVI.
    3. "Customer and You: Two-way Communication." 7172 BAVI.
    4. "Motivation and Productivity: Management of Human Assets." 7174 BAVI.
    5. "Service Center for Industry." National Association of Manufacturers. Film Bureau, 277 Park Ave., New York, NY 10017.
    6. "Sales Retail: Sales Building Role." 6554 BAVI.

SHEEP PRODUCTION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in sheep production, sheep science and will be able to relate these factors to his/her own specific needs and aspirations.
B. Name the leading states in sheep production.
C. List the advantages and disadvantages of the sheep enterprise.
D. Name the different wool classifications for sheep and identify the breeds in each classification.
E. Discuss the considerations necessary in selecting a breeding flock's foundation stock.
F. Identify the parts of a sheep.
G. List and discuss the various feeds suitable for feeding Wisconsin flocks.
H. Explain the differences in a ration designed for a ewe, lamb, and ram.

I. Formulate a sheep management plan including lambing, weaning, flushing, breeding, gestation, castrating, docking, eartagging, and shearing practices.
J. Understand the kinds of records necessary and their importance for profitable sheep production.
K. Discuss the shelter and equipment requirements for sheep production.
L. Explain the common sheep breeding programs.
M. Recognize the various internal and external parasites of sheep and discuss their life history, symptoms, prevention and treatment.
N. Discuss the diseases which pose the greatest problems to sheep, their cause, symptoms, prevention and treatment.
O. Explain the law of supply and demand as it relates to marketing meat and wool.
P. Describe the grades of slaughter lambs.
Q. Compare the different methods of marketing sheep.
R. Explain the factors which determine the value of wool.
S. Discuss the techniques in showing sheep.

II. Concepts to Develop

A. There are career opportunities in sheep science and production for young men and women at all levels of educational preparation.
B. To achieve the potential of each breed the sheep raiser must be familiar with their characteristics.
C. Profitable sheep production is dependent on the selection of prime foundation stock and correct management procedures.
D. Sanitation plays an important role in maintaining flock health.
E. Knowledge of the nutritional requirements of sheep is essential when implementing a feeding program.
F. Producer involvement in the marketing of meat and wool is essential.
G. Exhibiting quality animals is an effective means of advertising breeding stock.

III. Subject Matter to Teach

A. Careers
   1. Considerations in raising sheep
   2. Profit potential in sheep production
   3. Necessary skills
   4. Future outlook on sheep and wool production
      a. Per capita lamb consumption
      b. Competition of synthetic fibers
B. Opportunities in sheep production
   1. Advantages and disadvantages of sheep.
   2. Areas of sheep production.
   3. Determining the kind and size of operation.
C. Classes and breeds of sheep
   1. Classes.
   2. Breeds and their characteristics.
D. Selection of the breeding flock
   1. Considerations in starting a flock.
   2. Selecting a breed.
   3. Criteria for selecting individuals.
   4. Sources of foundation stock.
E. Feeding the flock
   1. Flushing.
   2. Feeding the pregnant ewe.
   3. Lactation rations.
   4. Feeding the breeding ram.
   5. Creep rations.
   6. Fattening rations.
F. Management of the flock
   1. Breeding and reproduction.
   2. Record keeping.
   3. Planning a yearly activity list.
   4. Culling the flock.
   5. Lambing practices.
   6. Docking, castrating, and eartagging.
   7. Shearing.
   8. Shelter and equipment.
G. Parasites and diseases
   1. Life cycle or cause.
   2. Symptoms.
   3. Prevention and treatment.
H. Marketing meat and wool
   1. Supply and demand
   2. Feeder and market grades.
   3. Methods of marketing.
   4. Determining the value of wool.
I. Fitting and showing sheep
   1. Show classifications.
   2. Feeding for the show.
   3. Shearing and grooming.
   4. Showing techniques.

IV. Motivation

A. Field trips to
   1. Sheep farm.
   2. Livestock show.
   3. Judging contest.
   4. Wool marketing facility.
   5. Slaughter plant.
B. Films, filmstrips, and slides
C. Resource Speakers
   1. Veterinarian.
   2. Sheep buyer.
   3. Sheep producer.

V. Learning Activities

- A. Occupational experience program
- B. Collect and analyze various feedtags.
- C. Group report on breeding systems.
- D. Castrate a lamb.
- E. Dock a lamb.
- F. Label the parts of the sheep on a drawing.
- G. Use a meat cutting chart to illustrate the components of a lamb carcass.
- H. Keep a daily record of prices for market grades of sheep.
- I. Make drawings of a housing and equipment layout for a specific flock size and type.
- J. Balance rations for various classes of sheep using home grown and/or commercial feeds.
- K. Prepare a bulletin board of breeds of sheep and meat and wool characteristics of each.
- L. Demonstrate the shearing of a sheep.
- M. Demonstrate the proper way to show a sheep.

VI. Materials Needed

- A. Books
  1. Bundy & Diggins. *Sheep Production* Prentice-Hall, Inc. 1958.
  2. Bundy & Diggins. *Livestock and Poultry Production*. PrenticeHall, Inc. 1975. 4th Edition.
  3. Ensminger. *Sheep and Wool Science*. Interstate. 1970.
  4. Marsh. *Sheep Diseases*. Williams and Wilkins.
  5. Morrison. *Feeds and Feeding*. Morrison Publishing. 1961.
  6. *"Sheep Improvement Handbook"* - UWEX
- B. Bulletins and Pamphlets
  1. "Adding to Your Income with Sheep." U.W.-Extension, Madison, WI.
  2. "Docking, Castrating and Eartagging Lambs." U.W.-Extension.
  3. "Feeding Lambs." University of Illinois.
  4. "Housing and Equipment for Sheep." U.W.-Extension.
  5. "Management Steps in Starting and Maintaining a Sheep Flock." U.W.-Extension.
  6. "Profitable Sheep Production." U.W.-Extension.
  7. "Story of Wool." American Wool Council.
- C. Films and Filmstrips
  1. "Breeds of Sheep" (Filmstrip), Vocational Agriculture Services. University of Illinois.
  2. "Fat Lamb Projects" (Filmstrip), Vocational Agriculture Productions, California.
  3. "Grooming and Showing Sheep." (Filmstrip), NASCO. Fort Atkinson, Wisconsin.
  4. "Judging Sheep." (Filmstrip), NASCO.
  5. "Selecting Breeding Sheep." Vo-Ag. Services.
  6. "Shearing Sheep." (Filmstrip), NASCO
  7. "The Sheep Management Series." Vocational Education Productions, California Polytechnic Institute, San Luis Obispo, CA
- D. Laboratory Manuals
  1. 1973 *Livestock Production Manual*. National Vo-Ag Book Co., Sheldon, Wisconsin.

SMALL GAS ENGINES

I. Performance Objective

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the agricultural power industry and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Be familiar with small gas engine components, terminology, and principles of operation.
- C. Employ fundamental skills and knowledge necessary to perform preventative maintenance, utilize diagnostic procedures, and tune-up operations on small gas engines.
- D. Perceive shop safety, and the proper use of mechanics' tools and equipment.
- E. Interpret shop manuals to locate specifications and parts books to order replacement parts.
- F. Overhaul major small gas engines.

II. Concepts to Develop

- A. There are career opportunities in agricultural power for young men and women at all levels of educational preparation.
- B. Safety is an attitude that needs to be developed and practiced.
- C. As all engines function, they employ basic principles of operation.

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D. Preventative maintenance on small engines is a good and necessary practice.
E. All tools have proper uses.
F. Each mechanized task has a suggested procedure.
G. Manuafacturer's manuals and parts books are sources of important information.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job descriptions.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.
B. Shop tool identification and proper application
   1. Hand tools.
   2. Power tools.
   3. Instrumentation
C. Fasteners and torque wrenches
   1. Fastener and thread identification.
   2. Application of torque wrenches.
D. Shop equipment operation
   1. Cleaning equipment.
   2. Reconditioning equipment.
E. Shop safety
   1. Eye safety and appropriate dress.
   2. Housekeeping.
   3. Shop rules and attitude.
F. Engines — Principles of operation and identification
   1. 4-stroke cycle.
   2. 2-stroke cycle.
G. Engine component identification
   1. Stationary and moving parts.
H. Small gas engine preventative maintenance programs
   1. Cooling systems.
   2. Engine cleaning procedures.
   3. Air cleaners — breathers.
   4. Lubrication systems.
   5. Fuel selection—use—storage.
   6. Plug service.
   7. Carburetor service.
   8. Compression checks.
   9. Battery service.
I. Engine starting and operation
   1. Starting procedures.
   2. Operating procedures.
   3. Engine operated equipment safety.
J. Engine storage
   1. Importance of proper storage.
   2. Engine protection procedures.
K. Small gas engines—diagnostic procedures
   1. Ignition.
   2. Carburetion.
   3. Compression.
L. Service manuals—parts books—service records
   1. Engine specifications.
   2. Parts catalogs.
   3. Service and business records.
M. Measuring instruments
   1. Micrometers.
   2. Calipers.
   3. Gauges.
   4. Speed measuring tools.
N. Major small gas engine maintenance and repair
   1. Shop procedures and workmanship.
   2. Starters.
   3. Ignition systems.
   4. Fuel systems.
   5. Governors.
   6. Valves.
   7. Cylinders and piston rod assemblies.
   8. Lubrication systems.
   9. Cam and crank assemblies.
O. Power transmission systems
   1. V-belts—sheaves.
   2. Chains—sprockets.
   3. Gears.
   4. Bearings.
   5. Clutches.
P. Mower blade sharpening
   1. Removal—inspection.
   2. Sharpening—balancing.

IV. Motivation

A. Family—student engines utilized in laboratory.
B. Slides, filmstrips, transparencies presented.
C. Trouble shooting contests.

V. Learning Activities

A. Occupational experience program.
B. Tool, equipment, instrument, fastener identification and application.
C. Safety instruction.
D. Engine principles and parts.
E. Engine tune-up laboratory.
F. Engine troubleshooting contests.
G. Engine overhaul laboratories.
H. Service specification and parts ordering laboratory.
I. Measurements laboratory.
J. Mower blade sharpening.

VI. Materials Needed

A. Books

1. Air Cooled Engine Mechanics Training Manual — Principles of Operation, Service & Maintenance — Pub. by Engine Service Association — 735 No. 2nd St. Milwaukee, Wisconsin, 53203
2. Chain Saw Service Manual — 11th Edition — Technical Publications Division — P.O. Box 12901 — Overland Park, Kansas 66212
3. Compact Tractor Service Manual — 1st Edition, Volume I & II Technical Publications Division — (Air Cooled Engines Over 14 H.P.)
4. Light Utility Tractor Service Manual — Volume I — 1st Edition — Technical Publications Division (Liquid Cooled Engines Under 35 H.P.)
5. Outboard Service Manual — Technical Publications Division
6. Small Engines — Volume I & Volume II — AAVIM — Athens, Georgia 1979
7. Small Engines Service Manual — 11th Edition — Technical Publications
8. Small Engines Training Manual — Howard W. Sams — 1973
9. Small Gasoline Engines — Operation—Maintenance — 1973 Hobar Pub. 1234 Tiller Lane, St. Paul, Minn.
10. Small Tractor Service Manual — 4th Edition, Volume I & Volume II — Technical Publications — Overland Park, Kansas
11. Snowmobile Service Manual — 7th Edition — Technical Publications

B. Service Manuals

Briggs & Stratton Corporation — Milwaukee, Wisconsin — 53201

Kohler Company — Kohler, Wisconsin — 53044

Onan — 1400 — 73rd Ave., N.E., Minneapolis, Minn. — 55432

Tecumseh Products Co. — Lauson Power Products Engine Division 900 North St. — Grafton, Wis. 53024

C. Booklets, Pamphlets, Study Guides

Available from Briggs & Stratton — Milwaukee, Wis. 53201

1. General Theories of Operation
2. Repair Instructions IV

Available from Ohio State University — Columbus, Ohio

1. Individual Study Guide on Carburetion
2. Individual Study Guide on Electrical Systems for Spark-Ignition Engines

Available from College of Agriculture, University of Illinois, Urbana

1. Small Engines — Principles of Operation, Trouble Shooting & Tune-up
2. Small Engines — Repair and Overhaul
3. The Two-Cycle Engine

D. Slides — Slidefilms

Slide sets available from AAVIM — Athens, Georgia

1. Care & Operation of Small Engines — Volume I
2. Care & Operation of Small Engines — Volume II

Slide sets available from Briggs & Stratton — Milwaukee, Wis.

1. Complete Overhaul — 6 & 8 Cubic Inch Aluminum Alloy Engines
2. Engine Check-up Class — 6 & 8 Cubic Inch Aluminum Alloy Engines
3. Start, Stop, Store
4. Valve and Seat Reconditioning

Slide Sets available from Hobar Publishing Co. 1234 Tiller Lane — St. Paul, Minn. — 55112 — Cassette Included.

1. Battery Ignition System
2. Carburetor Laboratory
3. Chain Saw Maintenance
4. Magneto Ignition Kit
5. Magneto Ignition Laboratory
6. Magneto Ignition System
7. Small Engine Disassembly
8. Snowmobile Carburetor Laboratory

SMALL GRAINS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the production of small grains and relate these factors to his/her own specific needs and aspirations.

B. Identify seeds of the various small grains.

C. Grade small grains and judge them.
D. List and discuss the soil and climatic requirements of small grains.
E. Describe the important uses of the small grains both for feed and commercial use.
F. Select the varieties of grain suited to a particular area.
G. Explain the cultural practices for small grain production.
H. Compare the weights per bushel, nutritive value, T.D.N. protein, and bushels per acre.
I. Identify five diseases and pests of small grains and discuss recommended control measures.

II. Concepts to Develop

A. There are career opportunities in small grain production and plant science for young men and women at all levels of educational preparation.
B. Species of small grains vary in their nutritional value.
C. Small grains are grown for a variety of uses.
D. Knowledge of plant and seed characteristics is essential for proper identification.
E. Climate and soil requirements must be considered when selecting the species of small grains to be grown.
F. Recommended cultural practices help to assure a good yield.
G. Knowledge of harvesting, storing and marketing techniques are essential ingredients in profitable small grain production.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment information.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relative to potential employment.
B. Identification of the small grains and grading
  1. Major small grains.
  2. Hybrids
C. Climatic and soil requirements for small grains
D. Importance and uses of small grains and marketing.
E. Cultural practices
  1. Seed treatment and testing.
  2. Seedbed preparation.
  3. Time of planting.
  4. Rate of seeding.
  5. Disease and pest control.
  6. Harvesting practices.
  7. Yields and weights.
  8. Storage and marketing.

IV. Motivation

A. Field trips to area farms.
B. Field trips to elevators and seed houses.
C. Slides on diseases and pests.
D. Films and filmstrips.
E. Bulletin board displays.
F. Demonstration Plots.

V. Learning Activities

A. Collect and identify small grain samples.
B. Prepare mounts of small grains.
C. Collect and display head samples of diseased small grains.
D. Treat a small grain plot for disease control, fertilization, agricultural differences.
E. Prepare a report on the various storage methods.
F. Review statistical Reports.

VI. Materials Needed

A. Books
  1. Bear, et. al. *Hunger Signs in Crops*. American Society of Agronomy, Washington, D. C.
  2. Brickbauer & Mortenson. *Approved Practices in Crop Production*. Interstate.
  3. Delorit, Grueb & Ahlgren. *Crop Production*. 4th ed. Prentice-Hall. 1974.
  4. Hughes, et. al. *Crop Production*. MacMillan. 1957.
  5. Wilson. *Producing Farm Crops*. National Farm Book Co.
B. Pamphlets and Bulletins
  The following are available from the University of Wisconsin - Extension.
  1. A2394, "Barley Varieties for Wisconsin"
  2. A1543, "Common Barberry Spreads Stem Rust" (C 474)
  3. A2296, "Field Crops Herbicide Manual" (MA - 3))
  4. A2471, "Small Grain Production in Wisconsin"
  5. A2038, "Oat Seed Quality and Seeding Practices"
  6. A1929, "Oat Varieties for 1979"
  7. R1733, "Oats, Cultures and Varieties" (B 540)
  8. A1453, "Seed Treatments to Control Small Grain and Forage Diseases"

    9. IN AE67A, "Selecting a Grain Drying Method"
    10. R1782, 'Small Grain Variety Performance in Wisconsin" (B550)
    11. A1902, "The Soil Survey"
    12. A2402, "Spring Wheat Varieties for Wisconsin"
    13. A1981, "Pest Control in Forages and Small Grains"
    14. NCXP36A, "Weeds of the North Central States"
    15. A2421, "Wild Rice Processing in the Upper Great Lakes Region"
    16. A2413, "Winter Wheat in Wisconsin"
    17. A2590, "Oats for Forage"

C. Periodicals
    1. *Crops and Soils*
    2. *Doane's Agricultural Report*
    3. *Drovers Journal*
    4. *Farm Journal*
    5. *Farm Technology*
    6. *Successful Farming*
    7. *Wisconsin Agriculturist*
    8. *Agri-Fieldman and Consultant*

D. Films and Filmstrips
    1. "Origin of Wheat," 3164, BAVI
    2. "Pests or Plenty," 1572, BAVI
    3. "Seeds and Science — The Western Story," 1554 BAVI
    4. "Seeds of Plenty," 7696, BAVI
    5. "Stem Rust — Airborne Enemy of Grain," 2099, BAVI
    6. "Wheat Rust," 5120, BAVI
    7. "Who Shall Reap," 4383, BAVI

SOILS, ADVANCED

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in soil science and will be able to relate these factors to his/her own specific needs and aspirations.
B. Understand what soil is, and how it was formed.
C. Use the terminology of soil science.
D. Categorize the trends and sequences in the development of soils in the area.
E. Recognize the soil classes of the area by visual inspection.
F. Determine the best use of area soils.
G. Contrast the eight land capability classes.
H. Recognize the soil's structure, texture, and color.
I. Select land practices to be used on different soil types.
J. Value soil as a great resource.
K. Discuss the relationship of the soil to the community.
L. Recognize mineral deficiency symptoms in plants.
M. Compare soil conservation practices.
N. Discuss the sources of the nutrients.
O. Write a paragraph on each essential nutrient and the function each performs in the plant.
P. Calibrate a fertilizer applicator.
Q. Select the amount and kind of fertilizer to be used based on a soil test, the crop to be grown, and the expected yield.
R. Perform a tissue test.
S. Utilize mathematics to change oxides to elemental forms, and back, with special emphasis on the ability to evaluate fertilizer as to cost per unit.
T. Compare different methods of applying fertilizer.
U. Contrast the forms of commercial fertilizers.
V. Explain the ways fertility is lost.
W. Conclude why certain fertilizer nutrients do or do not leach readily into the soil.
X. Compare the various rates of solubility in relationship to the different forms of fertilizer.
Y. Associate the chemical abbreviation with elements contained in the fertilizer.
Z. Contrast the effects of pH on the availability of nutrients.
AA. Write a paragraph describing the physical and chemical properties of fertilizers.
BB. Explain what pH measures.

II. Concepts to Develop

A. There are career opportunities in soil science for young men and women at all levels of educational preparation.
B. The formation of soil is a slow and continuous process.
C. Soil is one of our most precious resources, for without it, plant and animal life could not exist on this planet.
D. Each type of soil has unique characteristics.
E. Soils formed under grasses are the most fertile.
F. A positive relationship exists between the organic matter content of a soil and its level of fertility.

G. A positive relationship exists between the organic matter content of a soil and its water holding capacity.
H. A soil's nutrient level must be replenished to the extent that elements are removed by plants.
I. Soils which are deficient in plant food are more subject to erosion than those which have received adequate amount of nutrients.
J. Plants differ in their response to pH.
K. Each of the sixteen elements needed for plant growth serves a unique purpose.
L. Properly inoculated legumes can utilize nitrogen from the air.
M. Microorganisms function best in soils which are neutral.
N. Capillary water is the only form of soil moisture which is available to plants.
O. Land forming is an effective method of controlling surface water on soils which are poorly drained.
P. Land classification is an aid in determining its best use.
Q. Every person needs to be concerned about soil and water conservation.
R. The tissue test is a valuable aid in detecting the deficiencies of elements.
S. Crops vary in their nutrient requirements.
T. Most soils are deficient in several elements.
U. Certain discolorations in plants indicate that a specific element is lacking.
V. Some fertilizers leach more readily than others.
W. The solubility of commercial fertilizers varies.
X. High crop yields over a period of time can not be realized without the generous use of commercial fertilizers.
Y. A bag of fertilizer is not all plant food.
Z. Some crops require several applications of commercial fertilizer during the growing season.
AA. All decisions concerning the applications of commercial fertilizer should be based on a current soil test and the availability of funds.
BB. All cropland should have a soil test at least once during the rotation.
CC. The machine processed soil test report contains much useful information.
DD. Fertilizers can be blended to match the results of any soil test.
EE. Fertilizers are available in several forms, therefore, specialized equipment is needed for their application.
FF. The law of diminishing returns becomes evident when generous amounts of fertilizer are applied.

III. Subject Matter to Teach

A. Development of soils
    1. As a result of water, wind, glaciers, forest, grasses.
    2. The great orders of soil.
    3. Characteristics of a soil horizon.
    4. Major factors used in describing soils and soil horizons.
    5. Soil groups of the United States, their development and characteristics.
    6. Soil chemistry.
B. Organic matter and its relationship to soil fertility.
    1. What is organic matter?
    2. The importance of organic matter.
    3. Methods used to increase or maintain the organic matter of the soil.
    4. The carbon-nitrogen ratio.
C. Life found in the soil
    1. Importance of microorganisms in the soil.
    2. Kinds of microorganisms in the soil.
    3. Other forms of life in the soil.
    4. The nitrogen fixation process.
    5. The process of inoculating legumes.
    6. Benefits derived from inoculating legumes.
    7. Harmful effects of soil microorganisms.
    8. Factors which favor the growth and activity of soil microorganisms.
    9. Soil management practices and its relationship to the activity of microorganisms.
    10. Higher forms of animal life in the soil and their effect in the soil.
D. Water in the soil
    1. The importance of water in soil formation and plant growth.
    2. Types of water in the soil.
    3. Ways water enters and moves in the soil.
    4. Adhesion and cohesion.
    5. Classes of soil, water and their availability to plants.
    6. Water holding capacity of soils.
    7. Methods used to determine the moisture content of soils.
    8. The importance of proper water management.
    9. Methods of increasing available water to crops.
    10. Methods used to reduce water losses from the soil.
E. Plant growth
    1. The life process of plants.

2. Components of a cell—their composition and function.
3. Describe the following:
    a. Photosynthesis
    b. Transpiration
    c. Respiration
    d. Digestion
    e. Assimilation
    f. Growth and reproduction
4. Functions of the root system.
5. Development of roots.
6. Types of root systems.
7. Extent of the root system.
8. Types and functions of stems.

F. Environment and its effect on plant growth
1. Heredity factors.
2. Crop environment.
    a. The effects of light.
    b. The effect of temperature on the growth of plants.
    c. Soil moisture supply and its effect on plant growth.
    d. Effect of humidity, precipitation and wind on plant growth.
    e. The need for air in the soil.
    f. The effect of soil texture, structure, fertility and soil reaction on plant growth.
    g. The effect of weeds.
    h. The effect of insects and diseases on plant growth.

G. Elements necessary for plant growth
1. Elements needed for plant growth which are obtained from the air — the importance of carbon dioxide.
2. Elements needed for plant growth which are obtained from water.
3. Major elements obtained from the soil — deficiency symptoms — their effect on plant growth — means of replenishing the supply in the soil.
    a. Nitrogen
    b. Phosphorous
    c. Potassium
    d. Calcium
    e. Magnesium
4. Trace elements needed for plant growth — deficiency symptoms — their effect on plant growth — means of replenishing the supply in the soil.
    a. Iron
    b. Boron
    c. Manganese
    d. Copper
    e. Molybdenum
    f. Chlorine

H. Soil reaction and liming.
1. The need for understanding the ionization of molecules.
2. Define an ion, a molecule, an electron and a cation.
3. Means of expressing soil acidity and alkalinity.
4. Colloids and soil reaction.
5. Tests used to determine soil reaction.
6. The development of acid and alkaline soils.
    a. Range of reaction in soils.
    b. Seasonal effects on soil acidity.
7. Soil reaction and its effect on plant growth.
    a. Plants which favor a weak acid or neutral soil.
    b. Plants which will tolerate a moderately acid soil.
    c. Plants which will tolerate an acid soil.
8. Liming the soil
    a. Ways liming material became deficient in the soil.
    b. The function of lime in the soil.
    c. Benefits derived from adding lime to the soil.
    d. Lime materials and their value in terms of calcium equivalents and the rapidity with which they correct soil acidity.
    e. The application of liming materials.
        1) Time of application.
        2) Method of application.
        3) Rate of application.
        4) Factors which determine the amount of lime needed to obtain the desired pH.

I. Commercial fertilizers
1. Reasons why commercial fertilizers are applied.
2. Types of commercial fertilizers available.
3. How commercial fertilizers are sold.
4. The meaning of grade.
5. Information contained in the guaranteed analysis.
6. Major and minor elements contained in commercial fertilizers.
7. Amount of commercial fertilizer to apply.
    a. Rates for maximum yields.
    b. Rates for maximum profits.
8. Time of application.

- 9. Fertilizer placement.
  - a. Banding.
  - b. Side dressing.
  - c. Drilling in with the seed.
  - d. Plow sole application.
  - e. Broadcasting.
  - f. Spreading with manure.
- 10. Kinds of commercial fertilizer
  - a. Nitrogen fertilizer.
    - 1) Sulfate of ammonia.
    - 2) Nitrate of soda or sodium nitrate.
    - 3) Ammonium nitrate.
    - 4) Anhydrous ammonia.
  - b. Phosphate fertilizers.
    - 1) Rock phosphate.
    - 2) Super phosphate.
  - c. Potash fertilizers.
    - 1) Nitrate of potash.
    - 2) Sulfate of potash.
- 11. State laws which apply to commercial fertilizers.

J. Animal manure and its effect on soil fertility.
- 1. Value of manure in maintaining soil fertility.
- 2. Fertilizer content of manure produced by farm animals.
  - a. Cattle.
  - b. Hogs.
  - c. Sheep.
  - d. Horses.
- 3. Influence of bedding and feed on the fertilizer content of manure.
- 4. Methods used to conserve the elements contained in barnyard manure.
- 5. Methods of handling manure.
- 6. Methods of applying manure.
- 7. Rates of application.
- 8. Crops and soils which are most benefitted from an application of manure.

K. Land drainage and its effect on land use
- 1. Effects resulting from too much water and prolonged wetness.
  - a. Root growth.
  - b. Tilth.
  - c. Cultural practices.
  - d. Costs.
- 2. Drainage methods
  - a. Surface drainage.
    - 1) System of ditching and design.
    - 2) Effectiveness.
    - 3) Soil cover, land slope and condition of soil.
    - 4) Preventing erosion.
    - 5) Ditch construction.
  - b. Subsurface drainage
    - 1) Where used.
    - 2) Types of systems.
    - 3) Tile — location of drains, size of tiles, selection, construction of tile drains, depth and spacing of tile.
- 3. Maintaining drainage systems
  - a. Importance of keeping ditches free of refuse, weeds, trash, brush and silt.
  - b. Sod outlet ditches and their effect on maintenance costs.
  - c. Inspection and care of tile drainage systems.
  - d. Effects of continuous cropping on tile drainage systems.

L. Soils and water conservation
- 1. Types of erosion
  - a. Wind
  - b. Water
- 2. Changes in the landscape due to erosion.
- 3. Agricultural practices which permit erosion.
  - a. Overgrazing
  - b. Plowing and working up and down the slope rather than on the contour.
  - c. Tilling soil of low fertility.
  - d. Failure to maintain proper organic matter content of the soil.
  - e. Removal of natural vegetation from the forest.
  - f. Exposure of the soil on sloping land.
  - g. Breaking up land which is susceptible to erosion.
- 4. Effects resulting from erosion
  - a. Reduced crop yields.
  - b. Greater need for commercial fertilizer.
  - c. Crops of lower nutritive value.
  - d. Loss of topsoil.
  - e. Formations of ditches and gulleys.
  - f. Siltation of lakes and streams.
  - g. Covering topsoil with lower fertility soils from highlands.
- 5. Extent of erosion in the United States
  - a. Land area of the U.S.
  - b. Percent damaged by erosion.
  - c. Losses caused by erosion.

6. Conservation programs in the United States
    a. Historical Background.
        1) George Washington, Thomas Jefferson, U. S. Grant, Theodore Roosevelt, Hugh Bennett, O. R. Zeasman, J. Stirling Morton.
    b. Present soil and water conservation activities.
        1) Soil conservation districts — function and operation.
        2) Assistance provided by business and industry.
        3) Grassland farming.
        4) Tree farming — shelterbelts, windbreaks and woodlots.
        5) Terracing.
        6) Strip cropping.
        7) Land forming.
        8) Crop rotation.
        9) Ponds and dams.

M. Ecology and its relationship to soil use
    1. The ecosystem.
        a. Members of the ecosystem.
        b. Checks and balances.
        c. The effect of change.
    2. Man and the soil.
        a. Man's affect on the soil.
        b. Reaction of the soil to man's presence.
    3. Balance of nature.

N. Careers
    1. Current and future employment
    2. Job descriptions
    3. Training requirements
    4. Working conditions
    5. Opportunity for advancement
    6. Other factors for employment

IV. Motivation

A. Field trips
    1. Land features of the area.
    2. Visit area farmers to view conservation practices.
    3. View wildlife conservation areas.
    4. Visit watershed management area.

B. Soil conservation class presentation by SCS personnel.

C. State Park Service Ranger class presentation.

D. Bulletin board displays.

E. Slide series of glaciation and glacial features.

F. Demonstrate the properties of pure phosphorous and potassium.

G. Complete soil science experiments by group and demonstrate to class. (Suggested experiments in soil science are prepared by California State Polytechnic College. Others can be taken from various soils units.)

V. Learning Activities

A. Occupational experience programs.

B. List conservation activities presently carried on at home and develop for needed plan of action for needed improvements.

C. Collect and test soil samples.

D. Fertilizer demonstration test plots.

E. Evaluate a conservation plan of the entire SCS district.

F. Develop a conservation plan for your district.

G. Participate in local and state land judging contests.

H. Titrate a sample of lime.

I. Use a sample IBM soil report and write recommendations for corrective and maintenance applications.

J. Complete work sheets on fertilizer arithmetic.

K. Collect and display plant specimens which show plant nutrient deficiencies.

L. Calibrate the fertilizer applicator on a corn planter.

M. Calibrate a broadcast fertilizer applicator.

VI. Materials Needed

A. Books
    1. Buckman & Brady. *The Nature and Properties of Soil*. 1969.
    2. Donahue. *Our Soils and Their Management*. 1976. National Farm Book Co.
    3. *Profitable Soil Management*. 1979 - Knuti - 3rd Edition; National Farm Book Co.
    4. Stallings. *Soil Use and Improvement*. Prentice-Hall. 1957.
    5. Walsh & Beatty. *Profitable Management of Wisconsin Soils*. University of Wisconsin. Agriculture Dept. Madison, Wisconsin.

B. Bulletins and Pamphlets
    1. "Conquest of the Land Through 7,000 Years." USDA, Washington, D.C.
    2. "Know Your Soil." USDA
    3. "Let's Stop Soil Erosion."ARC 613
    4. "Microorganisms." No. 955 USDA, 1964
    5. "Our Land and Its Care." National Plant Food Institute

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6. "Planning a Sound Land Use Program." UAS 2003

7. "Soils and Water Conservation in Wisconsin." USDA

C. Films

The following are available from BAVI — University of Wisconsin, Madison.

1. "Adventures of a Junior Raindrop," 0022
2. "Grass Roots in the Soil," 3537
3. "How Scientists Study the Soil," 5462
4. "Land Forming,"4235
5. "Life in a Cubic Foot of Soil,"5677
6. "Our Soil Resources,"2044
7. "Raindrops and Soil Erosion," 1812
8. "Plants and Their Importance," 1682
9. "Problems of Conservation: Soil," 7600
10. "What's Happening to Our Landscape?" 6366
11. "Conserving Our Soil Today." Coronet.
12. "Erosion Leveling the Land." Encyclopedia Brittanica Films.
13. "Problems of Conservation." Encyclopedia Brittanica Films.
14. "The Story of Soil." Coronet.
15. "What is Soil?" Encyclopedia Brittanica Films.

D. Filmstrips

1. "Agriculture Zoning and Land Use Planning." Vo-Ag Visuals, New Holland, Pa.
2. "Irrigation in Review," Vo-Ag Visuals.
3. "Pollution in Review," Vo-Ag Visuals.
4. "Soil Conservation in Review," Vo-Ag Visuals.
5. "Soil Science Transparencies," Vocational Agriculture Service, Illinois.
6. "Soil Tests in Review," Vo-Ag Visuals.

SOILS, BASIC

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the field or soil science and will be able to relate these factors to his/her own specific needs and aspirations.
B. Determine soil texture.
C. Understand soil origin, make-up and the interrelation of plants and soils.
D. Contrast the eight land capability classes.
E. Discuss the importance of fertilizers, how they are applied and explain the label on a fertilizer bag.
F. Use soil maps and explain their utility.
G. Realize the need for soil conservation practices and possess a practical knowledge of ecology.
H. Take a representative soil sample.
I. Recognize the difference in soil structure, texture and color.

II. Concepts to Develop

A. There are career opportunities in soil science for young men and women at all levels of educational preparation.
B. The understanding of basic soil properties is essential for proper land use.
C. Soil is essential for the production of food, fiber, and shelter.
D. Understanding the importance of soil conservation is essential for the welfare of all citizens.
E. A meaningful test result is an outcome of proper soil sampling.
F. Machine processed soil test reports contain much useful information.
G. Serious ecological problems surface when soil conserving practices are not followed.
H. The formation of soils is a slow and continuing process.

III. Subject Matter to Teach

A. Careers
   1. Current and future employment needs.
   2. Job description.
   3. Training requirements.
   4. Working conditions.
   5. Opportunity for advancement.
   6. Other factors relating to student needs and aspirations.

B. Origin of the Soil
   1. What is soil?
   2. The process of soil formation.
   3. Materials and processes of soil development.
   4. Movement of soil materials by glaciers, water, wind, and gravity.
   5. Shapes and sizes of structural soil units.
   6. Soil properties — texture, structure and tilth.
   7. Chemistry of the soil.

C. Determining Soil Fertility Through Testing
   1. Purpose of utilizing a soil test.
   2. Reasons for having the soil tested.
   3. Reliability of soil tests.
   4. Tests used for determining various soil nutrients.
   5. Soil sampling procedures.
      a. Importance of obtaining a representative sample.
      b. Procedure for obtaining a representative sample.
      c. Equipment needed for soil sampling.
      d. Record keeping.
   6. Availability and reliability of soil testing kits.
   7. Interpretation of machine processed records.
   8. Land Judging.

D. Fertilizers
   1. Basic types.
   2. Fertilizer labels —
      a. Information found on the label.
      b. Interpretation of information.
   3. Application of fertilizer.
      a. Soil test and its relationship to analysis and rate of application.

E. Land capability
   1. Factors causing land to be classified in one of eight classifications.
   2. Relating soil classification to land use.

F. Soil mapping
   1. The need for soil maps.
   2. Procedure for mapping soil.
   3. Manner in which soil maps are used.

IV. Motivation

A. Demonstrations — porosity test, capillary action, osmosis, organic matter and water runoff relationship.

B. Lectures presented by area SCS personnel.

C. Field trips to:
   1. Sample a field.
   2. Tour area to view erosion and conservation practices.

D. Bulletin board display.

E. Slides, film strips, overlays and films.

V. Learning Activities

A. Occupational experience program.

B. Use soil analysis sieves.

C. Take a soil sample, record information, send to state soils laboratory.

D. Locate parent's farm on a soil map, and determine the major soil type, per cent erosion, slope and decide what each soil type can best be used for on the basis of information provided in the soil survey and also from the knowledge attained from earlier classes.

E. Form demonstration groups and demonstrate concepts learned in class.

F. Test soil in school laboratory.

G. Reports or short speeches on a soil topic.

H. Soil judging at school site pit.

VI. Materials Needed

A. Books
   1. Donahue. *Our Soils and Their Management*. 1976. National Farm Book Co. or Interstate.
   2. Walsh. *Profitable Management of Wisconsin Soils*. 1972.
   3. Foth and Turk. *Fundamentals of Soil Science*. J. Wiley and Sons. 1966.

B. Bulletins and Pamphlets
   The following may be obtained from the University of Wisconsin - Extension.
   1. AB106G, "Our Productive Land"
   2. A2100, "Sampling Soils for Testing"
   3. A1513, "Soil Productivity Score Card" (C543)
   4. A1227. "How Good is Our Land." Mulcahy and Klingelhoets
   5. A1222, "We Can All Help Save Our Soil" (C360)

C. Films
   The following films are available from BAVI — University of Wisconsin.
   1. "Life in a Cubic Foot of Soil," 5677
   2. "Microscopic Life in Soil," 6799
   3. "Raindrops and Soil Erosion," 1812
   4. "Soil Test," 3552
   5. "Understanding Our Earth: Soil," 2875
   6. "Water Movement in Soils," 3660
   7. "What's Happening to Our Landscape?" 6366

D. Laboratory Manuals
  1. *Crop and Soil Science Student Study Manual*. Sheldon Book Company. Sheldon, Wisconsin.
  2. *Vocational Agriculture Soil Management Manual*. Sheldon Book Company.

SOYBEANS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the soybean industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Identify and label the parts of the soybean plant.
C. Explain the function of each part of the soybean plant.
D. Explain the pollination and fertilization process of the soybean.
E. List the primary nutrients and trace elements needed by the soybean plant and describe the function of each.
F. Describe the changes that take place during each stage of growth.
G. List and explain the various uses of the soybean plant.
H. Compare various insecticides and herbicides recommended for soybean production.
I. Contrast the methods of applying chemicals for weed control.
J. Compare the methods of soil preparation for soybean production.
K. Describe the farm implements used for producing soybeans and purpose of their uses.
L. Establish realistic standards and goals for the following efficiency factors: cost of producing a bushel of soybeans, machinery cost per acre, labor and management wage per acre, yield — bushels per acre, seeding rate, plant population, fertilizer rate, and harvesting loss.
M. Explain correct inoculation procedures and reasons for inoculation.
N. Discuss the factors restricting soybean yields; for each restricting factor be able to explain one innovative practice which holds promise or has been proven as a successful, cultural practice.
O. Choose recommended varieties for his/her area.
P. Select the correct seeding methods.
Q. Determine when to harvest soybeans and choose the best method for the drying process.
R. Contrast the various methods of soybean marketing.

II. Concepts to Develop

A. There are career opportunities in the soybean industry for young men and women at all levels of educational preparation.
B. Soybeans are grown for forage, seed and for use as a vegetable.
C. The soybean plant may be used for pasture, hay, silage or as a green manure crop.
D. The seed is used extensively as a feed for livestock and human food.
E. Soil and climate requirements are similar to those of corn.
F. Soybeans do not readily adapt to changes in soil and climate.
G. Good seedbed preparation is essential for high yields.
H. A high level of soil fertility is required for maximum yields.
I. Soybeans should not be planted until the soil temperature is at least 65° F.
J. Seed inoculation is a recommended practice.
K. The method of planting is dependent on the fertility of the soil, moisture conditions, the variety used and the purpose for which the crop is grown.
L. Soybeans should be planted as shallow as possible to insure quick germination and emergence.
M. Several chemicals may be used for effective weed control.
N. Unless diseases are effectively controlled, yields are substantially lowered.
O. Severe losses are the result when insects are not controlled.
P. Care must be exercised during harvesting to minimize losses.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
B. Importance of soybeans
  1. Local.

2. State.
3. World.
4. General and specific uses of the soybean.

C. Seed selection
   1. Determine growing season and climatic conditions.
   2. Identify recommended varieties for your conditions.

D. Soybean growth
   1. Parts of the soybean plant and their functions.
   2. Review of plant growth.
   3. Nutrient requirements.
   4. Inoculation.

E. Production techniques
   1. Soil type.
   2. Seedbed preparation.
   3. Implements used in producing soybeans.
   4. Seeding rate.
   5. Planting and cultivation procedures.
   6. Fertilization of soybeans.
   7. Herbicides and common weed identification.
   8. Insecticides and common insect identification.
   9. Harvesting and drying soybeans.

F. Soybean management
   1. Machinery costs.
   2. Labor requirements.
   3. Plant population.
   4. Yields.
   5. Harvesting losses.
   6. Overall cost of producing a bushel of soybeans.
   7. Factors restricting soybean yields.
   8. Innovative practices in soybean production.

G. Marketing soybeans
   1. Storage of soybeans.
   2. Hedging and futures' marketing.
   3. Quality factors.

IV. Motivation

A. Films, filmstrips and slides.
B. Charts and posters.
C. Bulletin board displays.
D. Field trips to successful growers.
E. Demonstration plot.

V. Learning Activities

A. Occupational experience programs including all phases of production.
B. Study characteristics of different varieties.
C. Prepare mounts of plants and seeds.
D. Collect and prepare mounts of diseased plants.
E. Collect and prepare mounts of insects which attack soybeans.
F. Study markets and prepare a graph of cash and futures' prices.
G. Perform germination tests.
H. Run demonstration of different seed bed preparation, pesticides, and fertilizer applications.

VI. Materials Needed

A. Books
   1. Bear, et al. *Hunger Signs in Crops*. American Society of Agronomy, Washington, D.C. 1949.
   2. Brickbauer & Mortenson. *Approved Practices in Crop Production*. Interstate. 1967.
   3. Delorit & Ahlgren. *Crop Production*. 4th ed. Prentice-Hall, 1973.
   4. Hughes, et al. *Crop Production*. MacMillan Company. 1957.
   5. Wilson. *Producing Farm Crops*. National Farm Book Co. 1960.

B. Pamphlets
   1. A1684, "Pest Control in Corn and Soybeans," Univ. of Wisconsin-Extension
   2. NCXT27, "Soybeans — Markets and Alternatives," Univ. of Wisconsin-Extension
   3. A8IAP441, "Profitable Soybean Production"
   4. A2665, "Harvesting and Drying Soybeans"
   5. A2364, "Rampage Soybeans"
   6. A2051, "Soybean Insects"
   7. APA1062, "4 Steps to Higher Soybean Profits"

C. Films
   1. "The Soybean Story." BAVI 2068.

D. Publications
   1. *Soybean News*
   2. *Soybean Digest*
   3. *Crops and Soils*
   4. *Weeds*
   5. *Farm Technology*
   6. *Agri-Fieldman and Consultant*

STRUCTURES, AGRICULTURAL

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the field of agricultural structures and materials handling and will be able to relate these factors to his/her own specific needs and aspirations.
B. Explain the principles of organizing farmstead building arrangements and be able to apply these principles to an actual farm situation.
C. Identify the different types of construction common to various farm housing needs.
D. Identify and compare types of feed, grain, roughage, waste disposal and milk handling equipment.
E. With the aid of essential resource data, identify the space requirements for farm livestock, crop and machinery storage.
F. Determine the utility needs for the various types of farm construction.
G. With assistance of current construction prices, estimate costs for building farm livestock, crop and machinery, housing, including installation of materials, and handling equipment.

II. Concepts to Develop

A. There are career opportunities in agricultural structures and materials handling for young men and women at all levels of educational preparation.
B. Proper farmstead arrangement improves the efficiency and use of farm buildings and equipment.
C. The utility, life and maintenance of a structure is influenced by its type of construction.
D. Structure, size and shape may vary depending on the type of livestock, crops, and machinery housed.
E. The health and comfort of livestock, quality of products, efficiency, sanitation, convenience and safety in buildings are dependent on well-planned use of available farm utilities.
F. Construction, maintenance and operational costs vary widely and change rapidly.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs.
    2. Job descriptions.
    3. Training requirements.
    4. Working conditions.
    5. Opportunity for advancement.
    6. Other factors relating to student needs and aspirations.
B. Farmstead building arrangements
    1. Factors affecting placement of various buildings
    2. Rearranging buildings for efficiency
    3. Check — Building codes and zoning codes
C. Types of building construction
    1. Building materials.
    2. Building design.
    3. Trends in construction.
    4. Drainage—DNR regulations.
    5. Building codes.
D. Systems of handling farm products
    1. Feed-Grain-Roughage distribution and drying.
    2. Waste disposal.
    3. Milking systems.
E. Space requirements
    1. Housing needs of various livestock, crops and machinery — Midwest Plan Service.
F. Utility needs
    1. Electrical requirements.
    2. Ventilation needs.
    3. Heating needs.
    4. Plumbing.
    5. Check codes in above areas.
G. Cost analysis
    1. Construction costs.
    2. Equipment costs.

IV. Motivation

A. Sketch a revision of the home farmstead.
B. Field trips to view types of construction and handling systems.
C. Filmstrips, films, and slides.
D. Resource persons visit classes and discuss materials handling equipment and types of construction.

V. Learning Activities

A. Occupational experience programs
B. Sketch a model farmstead.
C. Perform wiring and plumbing exercises.
D. Design and construct scale models of various farm building components.
E. Perform cost analysis of farm building waste handling systems.

F. Solve actual production problems.

VI. Materials Needed

A. Books:

1. Agricultural Buildings & Structures — Whitaker — Reston Publishing Co. Reston, Virginia — 22090 — 1979
2. Agricultural Wiring Handbook — 1978 — Food & Energy Council Inc. 909 University Ave. Columbia, Mo. 65201
3. Buildings for Small Acreages — Boyd — Interstate
4. Construction & Maintenance for Farm & Home — Foss — National Farm Book Co.
5. Electrical Construction Wiring — Alerich — American Technical Society 5608 Stony Island Ave., Chicago, Illinois 60637
6. Farm Buildings Handbook — 3rd Edition — Lytle — Structures Pub. Co. Farmington, Mich.
7. Maintaining the Lighting & Wiring System — AAVIM — 1974.

   The following Midwest Plan Service Books are available from Hobar Pub. Co., or the Agricultural Engineering Depts. at Iowa State University, Ames, Iowa; or, The University of Wisconsin, Madison.
8. MWPS — 1 Structures & Environment Handbook
9. MWPS — 2 Farmstead Planning Handbook
10. MWPS — 3 Sheep Handbook — Housing & Equipment
11. MWPS — 6 Beef Handbook — Housing & Equipment
12. MWPS — 7 Dairy Handbook — Housing & Equipment
13. MWPS — 8 Swine Handbook — Housing & Equipment
14. MWPS — 9 Designs for Glued Trusses
15. MWPS — 13 Planning Grain Feed Handling
16. MWPS — 14 Private Water Systems
17. MWPS — 15 Horse Handbook — Housing & Equipment
18. MWPS — 16 Family Housing Handbook
19. MWPS — 17 Professional Design Handbook
20. MWPS — 18 Livestock Waste Facilities Handbook
21. MWPS — 20 MWPS Building Plans
22. Planning Machinery Protection — AAVIM — 1979
23. Plumbing — Installation & Design — Ripka — American Technical Society
24. Residential Wiring — Rockis — American Technical Society
25. Shop Planning — AAVIM — 1975
26. Utility Buildings — AAVIM — 1974

B. Bulletins and Pamphlets:

1. "Cooperative Farm Building Plan Exchange Series"*
2. "Farm Silos" 1967 USDA, Agriculture Research Service*
3. "Fire Resistant Construction — Of Home — Of Farm Buildings" 1967 (Timmins, Merrill.)*
4. "Foundations For Farm Buildings" 1970 USDA Farmers Bulletin No. 1869.*
5. "Hog-Lot Equipment". 1967 Zeller, Bond, Petersen).*
6. "Houses and Equipment for Laying Hens." For Loose Housing. 1967 (OTA,* Hajime).*
7. "Making Basements Dry." 1970 (Rule).*
8. "Roofing Farm Buildings." 1969 (USDA Farmers Bulletin No. 2170).*
9. "Silos, Silage, Handling Practices, and Minor Feed Products." 1968 (USDA Economic Research Service).*
10. "Simple Plumbing Repairs For the Home and Farmstead." 1970 (USDA Farmers Bulletin No. 2202).*
11. "Use of Concrete on the Farm." 1970 (USDA Farmers Bulletin No. 2203).*

    *Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

C. Filmstrips, Slides and Transparencies

Filmstrips:

1. "How to Make Galvanized Roofs Last Longer," American Zinc Institute 324 Ferry St. LaFayette, Indiana.
2. "Metallic Zinc Paint for Metal Surface" American Zinc Institute.

Slides:

3. "Laying Concrete Masonry Units," Slidefilm No 434 — Vo Ag Service, College of Agriculture, University of Ill., 434 Mumford Hall, Urbana, Illinois.

4. "Planning and Preparing for Concrete Masonry Construction," Slidefilm 433 Vo-Ag Service, University of Illinois
5. "Special Concrete Masonry Problems," Slidefilm 435, Vo-Ag Service University of Illinois
6. "Understanding Electricity and Electrical Terms," AAVIM

Transparencies:

7. Farm Wiring and Safety — Vocational Instructional Services, Texas A & M University, College Station, Texas 77843
8. Maintaining the Lighting and Wiring System — AAVIM

D. Student Workbooks and Lab Manuals: The following are available from — Supervisor Vocational Agriculture, Subject Matter Specialist, 101 Petrie Hall, Auburn, Alabama, 36830.

1. Agri-Business Construction
2. Agri-Business Electricity
3. Agri-Business Masonry
4. Agri-Business Woodworking
5. Farmstead Planning Dairy Manual — Wisconsin Bridge & Iron Company, 5023 N. 35th Street, Milwaukee, WI

SUNFLOWER PRODUCTION

I. Performance Objectives

Upon completion of this unit the students will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training required, working conditions, opportunity for advancement, production costs and possible profits and will be able to relate these factors to his/her own specific needs and aspirations.

B. Identify the important and ideal growing areas for sunflowers, both in the U.S. and Wisconsin.

C. Be familiar with production costs and returns per acre for raising sunflowers.

D. Identify the different types and varieties of sunflowers that are practical for growing in Wisconsin.

E. Develop a plan for planting, fertilization and irrigation in the production of sunflowers.

F. Develop a plan for pest control. This includes disease, insects, weeds and birds.

G. Discuss the different uses, methods of harvesting and storage of sunflowers.

H. Be familiar with the location of markets, market demands for the area and the complete marketing process for sunflowers.

II. Concepts to Develop

A. There are career opportunities in sunflower production for interested people.

B. Sunflowers are quite quickly becoming a very popular as well as important crop in the agriculture business.

C. Sunflowers have may uses for humans as well as for livestock.

D. The importance of using new, more productive and easier harvesting varieties.

E. The cultural practices for sunflowers are different than for many of our farm crops.

F. There are many areas of importance in the marketing of sunflowers.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs
    2. Job description
    3. Training requirements
    4. Working conditions
    5. Opportunity for advancement
    6. Other factors relating to student needs and aspirations

B. Production history and growing regions of sunflowers

C. Factors to consider in growing sunflowers in Wisconsin
    1. Advantages
    2. Disadvantages

D. Determination of costs and returns per acre of growing sunflowers.

E. Types and varieties of sunflowers
    1. Oilseed
    2. Birdfeed
    3. Edible

F. Sunflower culture
    1. Type of climate and soil required
    2. Seedbed preparation
    3. Planting
        a. Date
        b. Depth
        c. Row width and plant population
    4. Fertilization
    5. Irrigation
    6. Weed control
    7. Insect control
    8. Disease control
    9. Bird control
    10. Harvesting and storage
        a. Grain
            (1) Desiccation

        - (2) Harvesting
        - (3) Drying
        - (4) Storage
        - (5) Seed grain standards
    - b. Silage
        - (1) Comparision of feed values with corn and alfalfa silages
- G. Marketing
    - 1. Type of sunflower in demand
    - 2. Location of market in relation to production areas
    - 3. Selling on current or futures market.

IV. Motivation/Learning Activities

- A. Field trips to area growers.
- B. Field trip to the U. of W. Experimental Farms
- C. Attend Farm Progress Days
- D. Occupational Experience Program
    - 1. Working for a sunflower grower.
    - 2. Raising sunflowers as a student project.
- E. Showing available films, slides and film strips.

V. Resource Materials Needed

- A. Publications
    - 1. "Sunflower Production and Marketing", Ext. Bulletin 25, North Dakota State University, Fargo, N. Dakota 58102
    - 2. "The Sunflower" (periodical), Box 2051, Fargo, N. Dakota 58107 (price-$5.00 for 9 issues)
    - 3. "Sunflower-Science and Technology", American Society of Agronomy, 677 S. Segoe Rd., Madison, WI 53711
    - 4. "Sunflower Production in Wisconsin", A3005 U. of W.-Ext. Bulletin. (June 1979)
    - 5. "The Sunflower Crop in Minnesota", Bulletin 299, Agr. Ext. Service, University of Minnesota (1973)
    - 6. "Sunflower Population, Row Width, and Row Direction", Misc. report 141, Agr. Exp. Station, University of Minn. (1976)
    - 7. "Pest Control In Sunflowers", A3075 U. of W.-Ext. Bulletin (Feb. 1980).
- B. Human Resources
    - 1. Prof. E. S. Oplinger, Assoc. Prof. of Agronomy, U. W.-Madison.
    - 2. Prof. J. D. Doll, Assoc. Prof. of Agronomy, U. W.-Madison.

SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAMS AND RECORDS — AGRIBUSINESS

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Become aware of the need and value of occupational experience programs.
- B. Develop an understanding of the requirements of some specific occupation in the field of agriculture/agribusiness.
- C. Prepare a written commitment on a career interest and goals that relate to the student's occupational experience program.
- D. Identify resources available for the development of a satisfactory occupational experience program.
- E. Become aware of the importance of good records.
- F. Understand the requirements of records and relate them to their enterprise or occupational experience program.
- G. Learn the various terms used in recordkeeping.
- H. Understand the importance of a good agreement designed to meet the needs of the student, parents, instructor and/or employer.
- I. Understand the importance of a financial statement and what it is to include.
- J. Record data in the recommended conditions column for each enterprise or activity following instruction in that unit.
- K. Develop the skill necessary to record competencies gained as the result of classroom and laboratory instruction in agribusiness.
- L. Prepare an inventory of items included in their occupational experience program.
- M. Compile an accurate account of records of income and expenses for the occupational experience program.
- N. Prepare a yearly financial summary of the occupational experience program.
- O. Record accurate information on all phases of student involvement in FFA and other youth activities.

II. Concepts to Develop

- A. Occupational experience programs are important for agribusiness students to prepare for entry into agribusiness and its related fields.
- B. Students need to know of the specific education and job training experience needed for the job of their choice.

C. There are career opportunities in the agribusiness fields of natural resources, horticulture, ag products, sales and service, ag supplies, equipment and mechanics, government and other professional areas.

D. There are resources available in most communities for all of the agribusiness areas, which can be used to help students and teachers to develop meaningful occupational experience programs for urban agribusiness students.

E. Records are important to keep track of financial and other personal items that may be needed at some later date.

F. Good records are up to date and complete as far as financial items, agreements, goals and plans, awards and activities, and occupational experiences.

G. Terms need to be learned to understand how to complete records as well as to learn to read other record-keeping systems.

H. Understanding the importance and make-up of a good written agreement is an essential part of good records.

I. A yearly financial statement should be well prepared.

J. Recording recommended conditions is important to have accurate and complete records that can be useful in management decisions.

K. Recording of competencies is essential so that students can see the skills they possess for their vocational objective.

L. An inventory is necessary to determine whether or not a profit or loss is being encountered.

M. Income and expenses need to be accurately compiled to see whether income or loss occurs and to better determine where additional gain can be made.

N. The financial summary should be used to analyze the occupational experience program.

O. Records of FFA and other activities are an essential part of records to be used for advancement in FFA and in gaining employment.

III. Subject Matter to Teach

A. Career opportunities available in the agribusiness fields of sales and service, ag-products, natural resources, horticulture, ag supplies, equipment and mechanics, and other professional areas.

B. Determine a possible occupational experience program based on student needs and what the student or community has to offer as resources.

C. Human relations
  1. Personality and job success
  2. Employer-employee relationships
  3. Co-worker relationships

D. Job application
  1. Looking for a job
  2. Employer's view of application
  3. Application blanks
  4. Resume
  5. Letter of application
  6. Various application tests (subject matter knowledge, motor skills, etc.)
  7. Job interview

E. Salesmanship
  1. Sales presentation
  2. Sales slips
  3. Charge accounts
  4. Change making

F. Student to develop plans and goal for an occupational experience program as it relates to his/her career interest. Example:
  1. Horticulture
    a. orchard operations
    b. greenhouse operations
  2. Sales and Service
    a. work at feed supply company
    b. seed and/or garden supplies

G. Occupational Experience Agreement
  1. Type of work
  2. Number of hours and length of employment
  3. Wages
  4. Responsibilities of student, employer, school, and teacher.
  5. Signatures

H. Recording techniques that relate to competencies gained by students in agribusiness related occupational experience programs. Example:
  1. Horticulture
    a. Learning proper soil mixes
    b. Learning to correctly water plants in a greenhouse
    c. Learning to transplant

I. Inventory
  1. Beginning inventory
  2. Closing inventory
  3. Value of items
  4. Interest on investment

J. Gifts and income other than occupational experience program.

K. Occupational experience program analysis.
  1. Assets
  2. Liabilities
  3. Net income or loss
  4. Interest on investment
  5. Labor income
  6. Cash wages

L. Work experience program.
    1. Type of work
    2. Hours worked
    3. Wages
    4. Deductions
    5. Dates worked

M. Summary of FFA activities
    1. Degrees earned
    2. Awards won
    3. Leadership activities
    4. Speaking activities
    5. Judging teams
    6. Fairs and exhibits

IV. Motivation

A. Fieldtrips — various agribusiness firms such as PCA, banks, farm equipment, etc., to view their booking systems.

B. Awards in FFA, WJDA, etc.
    1. Local
    2. State
    3. National
    4. Proficiency areas
    5. FFA degrees based on records
    6. Trips to National Convention, State Convention, etc.

C. Bulletin boards and displays on recordkeeping and/or occupational experience programs.

D. Resource speakers.
    1. Local FFA officers
    2. State and/or national FFA officers
    3. Local farmers and/or agribusinessmen
    4. Past agribusiness graduates
    5. FFA Alumni

E. Slides and films.
    1. FFA Stars Over America (annual films on farming and agribusiness) Venard Films
    2. FFA — Agriculture's New Generation — Venard Films

F. Have records available from past award winning members for students to review.

V. Learning Activities

A. Students to fill out a record book that suits their occupational experience program.
    1. Fill out records 5-15 minutes per week
    2. Record books to be graded based on completeness and neatness.

B. Students to fill out a simulated occupational experience program record book if for some reason they do not have a program.

VI. Materials Needed

A. Supervised Occupational Experience in Agriculture — Plans and Records The French-Bray Printing Co., P.O. Box 698, 6731 Baymeadow Dr., Glen Burnie, Maryland 21061, Phone 301-768-6000.

B. PCA FFA Handbook

PCA's of Wisconsin, David Klinefelter, President; Production Credit Association, P.O. Box 196, River Falls, WI 54022

Order from National FFA Supply Center, Alexandria, Virginia

C. Record and Plan Book for Students' Occupational Experience Program In:

Agribusiness, Natural Resources, and Environmental Protection. Wisconsin Association of Vocational Agriculture Instructors, 2117 Sherman Avenue, Madison, WI 53704

SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAMS AND RECORDS-PRODUCTION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Prepare an inventory, expense and income record.

B. Write a Production Supervised Occupational Experience Program agreement.

C. Identify the variety of Production Supervised Occupational Experience Program's available.

D. Perform a variety of improvement practices and skills related to their program.

E. Prepare a profit and loss statement and use the information in making management decisions.

F. Recover necessary and pertinent award application forms.

G. Display a pertinacious attitude toward Production Supervised Occupational Experience Program and recordkeeping.

H. Define and associate words and terms involving Production Supervised Occupational Experience Program and recordkeeping.

I. Prepare a financial statement.

J. Prepare an investment credit and income tax form.

II. Concepts to Develop

- A. Production Supervised Occupational Experience Programs lead to careers in farming occupations.
- B. There is a positive relationship between former students who have had good Production Supervised Occupational Experience Programs and current successful farmers.
- C. Production Supervised Occupational Experience Programs offer students an opportunity to explore enterprises.
- D. Successful Supervised Occupational Experience Program can be profitable.
- E. Supervised Occupational Experience Program records give students opportunity to learn recordkeeping necessary for making farm management decisions.
- F. Complete and accurate records aid enterprise and farm financing.
- G. FFA recognizes students with outstanding production Supervised Occupational Experience Programs by presenting awards on a local, state, and national level.
- H. Experience programs provide challenge for use of new innovative practices and skills to increase efficiency with the enterprise.

III. Subject Matter to Teach

- A. Production Agriculture Supervised Occupational Experience Programs
  - 1. Define production programs
    - a. Programs related to farming
    - b. Ownership and/or management of capital, land, livestock and other resources.
    - c. Experience leading to farming occupations.
  - 2. Types of Production Supervised Occupational Experience Programs
    - a. Beef
    - b. Crops
    - c. Dairy
    - d. Diversified livestock production
    - e. Forest management
    - f. Fruit and vegetable production
    - g. Placement in agricultural production
    - h. Poultry
    - i. Sheep
    - j. Swine
    - k. Other
  - 3. Production Agriculture Supervised Occupational Experience Program terms.
    - a. Productive enterprise
      - 1. Examples: Beef Cow-calf
        Corn for grain
        Farrow to finish swine
        Laying hens
        Dairy replacement
        Apple production
    - b. Improvement practice
      - 1. Examples: Animal identification
        Weed control
        Sire selection
        Production record
        Balanced rations
        Spray program
    - c. Skills
      - 1. Examples: Castrate
        Calibrate sprayer
        Clip needle teeth
        Culling
        Dehorn
        Pruning
- B. Production Supervised Experience Program records
  - 1. Purpose of records
    - a. For use in making management decisions.
    - b. Tool to establish credit.
    - c. Show total profit and/or loss.
    - d. Individual enterprise profit or loss.
    - e. Identify strengths and weaknesses of the enterprise.
    - f. Income tax
    - g. Application for FFA awards.
      - (1) Proficiency
      - (2) Wisconsin Farmer Degree
      - (3) American Farmer Degree
    - h. Application for other awards and scholarships.
  - 2. Terms used:
    - a. profit
    - b. income
    - c. expense
    - d. asset
    - e. liability
    - f. budget
    - g. financial statement
    - h. beginning and ending inventory
    - j. net income
    - k. Agreement with parent or cooperator
    - l. efficiency and management records
    - m. feed and supply expense

n. program plan
o. labor record
p. products used at home
q. barter items (labor for feed, etc.)
r. investment credit

C. Why have Supervised Occupational Experience Programs?
1. Leads to establishment in farming
2. Pride of ownership
3. Opportunity to learn by doing
4. Opportunity to make money
5. Qualify for awards
6. Requirement for enrollment in Vocational Agriculture and FFA membership

IV. Motivation

A. The challenge to be successful
B. Opportunity to grow financially
C. Pride
D. Resource speakers
E. Tours of outstanding projects
F. Participation in livestock shows and fairs
G. Local, state and national awards
H. FFA scrap book
I. Bulletin boards

V. Learning Activities

A. Contests, fairs and shows
B. Field trips
C. Demonstrations
D. Improvement practices
E. Interpretation of records
F. Use of records to manage the enterprise
G. Record needed for income tax reporting
H. Safety instruction
I. Discussion

VI. Materials Needed

A. Books
1. FFA Advisor Handbook, National FFA Center, 1975
2. Record and Plan book for Student Occupational Experience Programs, WAVAI, 1978
3. Curriculum Guide for Vocational Agriculture-Agribusiness, Dept. of Public Instruction, 1980
4. National Agriculture Proficiency Award Forms, Future Farmers of America, 1979
5. Agricultural Proficiency Award Reference, Future Farmers of America, 1980
6. Supervised Occupational Experience Program Record Book, Ag. Ed. Society, U. of W. - Platteville, 1978
7. Student Handbook, National FFA Organization and PCA, 1977
8. American Farmer Degree Handbook, The Future Farmers of America, 1978
9. Financial Planning in Agriculture, the Interstate, 1977
10. Facts and Figures for Farmers, Doane Ag. Service, Inc. 1977

B. Slide Set
1. A Proficiency Award For You. 80 slides with cassette, FFA Trust, 1975, UW-Madison, UW-River Falls, UW-Platteville.

C. Magazine
1. National FFA magazine

D. Forms
1. Wisconsin Farmer Degree application Form, State Office, current year.
2. American Farmer Degree application Form, State Office, current year.

SWINE PRODUCTION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in swine production and will be able to relate these factors to his/her own specific needs and aspirations.
B. Summarize the history of the swine industry.
C. List current breeds of swine and their contribution to the industry.
D. Compare the management inputs of the different systems of swine production.
E. Select breeding stock based on type, performance records and pedigrees.
F. Develop a breeding stock management plan.
G. Compare nutritional requirements of the various stages of swine growth in three general areas: birth to weaning, weaning to 125 lb. and 125 lb. to maturity.
H. Discuss swine facilities and equipment needed for the different phases of swine production.
I. Be familiar with the health and sanitation problems of swine raising.

- J. Know the offices to contact to keep abreast of state and federal rules and regulations affecting the swine industry.
- K. Know the market grades of swine.
- L. List and compare the methods of marketing swine for the different systems of production.
- M. Be familiar with fitting and showing swine.

II. Concepts to Develop

- A. There are career opportunities in the swine industry for young men and women at all levels of preparation.
- B. A knowledge of the history of the swine industry and the characteristics of the current breeds of swine is helpful in understanding contemporary trends in production.
- C. Systems of swine production consist of feeder pig production, farrow to finish, finishing and breeding stock.
- D. Management of breeding stock begins with selection and continues through before and during breeding, gestation, farrowing, lactation and A.I.
- E. Management of growing swine consists of the stages; birth to weaning, weaning to 125 lbs. and 125 lbs. to maturity.
- F. Swine facilities and their management will vary according to the system of operation, geographic and climatic conditions and personal preference.
- G. A sound health and sanitation program, consistent with state and federal regulations, is necessary in order to capitalize on sound management in all other aspects of the swine production.
- H. Marketing the end product is the final step in the swine production program.
- I. Fitting and showing of swine allow the student to demonstrate selection and management skills in class and at home.

III. Subject Matter to Teach

- A. Careers
  - 1. Current employment information.
  - 2. Job descriptions.
  - 3. Training requirements.
  - 4. Working conditions.
  - 5. Opportunity for advancement.
  - 6. Other factors relative to potential employment.
- B. Development of the swine industry
  - 1. Early development to the present.
  - 2. Breeds and their contribution to the industry.
- C. Systems of swine production.
  - 1. Feeder pig production.
  - 2. Farrow to finish.
  - 3. Finishing of purchased feeder pigs.
  - 4. Breeding stock production.
- D. Breeding stock management
  - 1. Herd improvement through selection.
  - 2. Normal swine breeding habits.
  - 3. Breeding systems, boar management and A.I.
  - 4. Management of sows and gilts before breeding to farrowing.
  - 5. Farrowing house and nursery management.
  - 6. Enterprise records, registration and pedigree, performance.
- E. Swine facilities and their utilization
  - 1. Facilities for sows, boars, and herd replacement.
  - 2. Farrowing facilities.
  - 3. Nursery.
  - 4. Finishing facilities.
- F. Management for swine health
  - 1. The breeding herd.
  - 2. Farrowing to weaning.
  - 3. Vaccination.
  - 4. Parasite control.
  - 5. Common swine disease.
  - 6. Sanitation.
  - 7. F.D.A. regulations.
- G. Marketing
  - 1. Market channels for hogs.
  - 2. Live feeder and market classes and grades.
  - 3. Carcass grade and yield.
  - 4. Production and price movements.
  - 5. Marketing breeding stock.

IV. Motivation

- A. Field trips for selection of breeding stock and market hogs.
- B. Field trips to study buildings, equipment and other facilities.
- C. Up-to-date instructional media on swine production.
- D. Bulletin board displays.
- E. Field trips to agribusinesses associated with the swine industry.
- F. Class discussion with resource person.

V. Learning Activities

- A. Occupational experience programs.
- B. Judging classes of breeding stock and market hogs.
- C. Fitting and showing swine.
- D. Interpretation of performance data.

VI. Materials Needed

- A. Books
  - 1. Bundy & Diggens. *Swine Production.* Prentice-Hall, 1976.
  - 2. Ensminger. *Swine Science.* Interstate. 1970.

3. Juergenson & Baker. *Approved Practices in Swine Production.* Interstate. 1971.
4. Ensminger. *Animal Science.* Interstate. 1977.

B. Pamphlets

1. "Swine Producers Management Handbook," University of Wisconsin-Extension.
2. Other Extension bulletins.

C. Periodicals

1. *Hog Farm Manager*
2. *National Hog Farmer*
3. *Nickles for Profit — Wisconsin Pork Producers*
4. *Drovers Journal*

D. Films, Filmstrips and Slides

1. "The Biotin Story," Farm Film Foundation.
2. "Modern Trends in Swine Production," U.S. Steel Corporation, 208 S. LaSalle Street, Chicago, Illinois 60690.
3. "Opportunities on the Hoof," Farm Film Foundation.
4. "Profitable Pork Selection," Farm Film Foundation.
5. "The Brood Sow and Litter," Vocational Education Productions. Calif. Polytechnic Institute, San Luis Obispo, Calif.
6. "Swine Carcass Evaluation," Vocational Education Productions. Calif. Polytechnic Institute, San Luis Obispo, Calif.
7. "Breeds of Swine," Vocational Agriculture Service, University of Illinois.
8. "U.S.D.A. Swine and Pork Carcass Grades," Vocational Agriculture Service, University of Illinois.
9. "Appraising Market Hogs for Carcass Merit," Vocational Agriculture Service, University of Illinois.
10. "Digestion in Swine," Vocational Agriculture Service, University of Illinois.

TOBACCO PRODUCTION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job availability, personal training requirements, working conditions, opportunities for advancement and other factors relative to potential employment in the tobacco industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Explain the cultural practices necessary for a successful crop.
C. Discuss the labor, machinery and building demands of the tobacco crop.
D. Select marketing procedures which maximize profits.
E. Categorize the uses of tobacco in both foreign and domestic channels.

II. Concepts to Develop

A. There are career opportunities in tobacco production and in the tobacco industry for young men and women at all levels of educational preparations.
B. Profitable tobacco production requires a specific type of soil and climate.
C. Tobacco harvesting utilizes several essential skills and procedures that assure a quality product.
D. Good cultural practices are essential for a successful crop.
E. The development of marketing skills has a positive effect on the income derived from the enterprise.

III. Subject Matter to Teach

A. Careers
    1. Current and future employment needs.
    2. Job descriptions.
    3. Training requirements
    4. Working conditions
    5. Opportunity for advancement.
    6. Other factors relating to student needs and aspirations.
B. Introduction
    1. Efficiency factors in tobacco production.
    2. Climate and soil type requirements.
    3. Labor, machinery and buildings required to grow the crop.
    4. Cost-profit in tobacco production.
    5. Fitting the tobacco enterprise into a program of dairy farming.
C. Choosing a variety of tobacco.

D. Starting plants in a bed.
  1. Building the bed.
  2. Soil preparations in the bed.
  3. Chemicals for weeds and disease control in the seed bed.
  4. Seeding the bed: time and rate.
  5. Watering, temperature control, control of insects and disease.
  6. Fertilizing the seed bed.

E. Cultural practices in the tobacco field
  1. Tillage practices of the soil.
  2. Fertilizing and manuring the tobacco crop.
  3. Maintaining correct pH: lime if under 5.7.
  4. Transplanting from the bed to the field—rate—time—method

F. Controlling insects, weeds, and disease in the field.

G. Harvesting
  1. Topping
  2. Suckering
  3. Cutting
  4. Piling
  5. Wilting
  6. Spearing
  7. Hanging in the shed
  8. Curing
  9. Stripping
  10. Storing on the farm

H. Marketing
  1. Where to market.
  2. When to market.
  3. Uses of tobacco.
  4. Development of domestic and foreign markets.

I. Economics of Tobacco
  1. Going market prices
  2. Breakdown of production costs
    a. Labor—58%
    b. Machinery costs—5%
    c. Supplies—10%
    d. Manure—7%
    e. Land rent—12%
    f. Misc. expenses—8%

J. Acreage Allotment
  1. Price support program
  2. Knowledge of the present laws by state and federal allocations
  3. A.S.C.S. office of the U.S.D.A.

IV. Motivation

A. Field trip to tobacco warehouse.
B. A knowledgeable tobacco marketing specialist to speak to vo-ag class.
C. Have students attend the tobacco exposition.

V. Learning Activities

A. Occupational Experience Program
B. Follow tobacco through marketing channels.
C. Study grade, pricing, and marketing reports.

VI. Materials Needed

A. Brickbauer & Mortenson. "Approved Practices in Crop Production". Interstate. 1978. 2nd edition
B. Hughes & Hanson "Crop Production". The MacMillan Co. 1957.
C. Trade Journals—(ex. "Tobacco Science")
D. Bulletins and Pamphlets.
  1. "Managing Wisconsin Tobacco Seedbed." Circular 441 — University of Wisconsin (Ogden and Newman) - Extension
  2. "Tobacco Curing." Circular 481 — University of Wisconsin (Ogden) - Extension.
  3. "Tobacco Seedbed Hints" Circular 44 — University of Wisconsin-(Ogden and Newman)—Extension.
  4. "Tobacco Seedbed Management." January 1959. University of Wisconsin-Extension. (Everson).

TRACTORS, AGRICULTURAL POWER

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the agricultural power industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Understand the principles of gasoline and diesel engines.
C. Distinguish the parts of the tractor and discuss their functions.
D. Use the operator's manual effectively in locating information.
E. Be able to perform preventative maintenance and minor repairs on tractors conducting service procedures on fuel systems, carburetors, air cleaner assemblies, crank case lubricant, hydraulic and transmission fluids, cooling systems, batteries, ignition systems, electrical systems, hydraulic systems and brakes.
F. Satisfactorily complete a safe tractor operator examination.

II. Concepts to Develop

- A. There are career opportunities in agricultural power for young men and women at all levels of educational preparation.
- B. Engines function by following basic principles.
- C. Preventative maintenance on tractors is an essential procedure.
- D. All tractor operations have a recommended system of servicing.
- E. Safety is a learned attitude.

III. Subject Matter to Teach

- A. Careers
  1. Current and future employment needs.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.
- B. Engines-How they work
  1. What is an "internal combustion" engine?
  2. Elements of an engine
  3. Engine cycles - 2 stroke - 4 stroke
  4. Engine systems
  5. Types of engines
  6. Uses of engines
  7. Basics of engines
- C. Basic Engine
  1. Cylinder heads
  2. Valves
  3. Camshafts
  4. Cylinder blocks
  5. Cylinders
  6. Pistons
  7. Crankshafts
  8. Balancers
  9. Main bearings
  10. Flywheel
  11. Timing Drives
  12. Engine "break-in"
- D. Gasoline Fuel Systems
  1. Fuel supply systems
  2. Fuel tanks
  3. Fuel lines and gauges
  4. Fuel pumps
  5. Fuel filters
  6. Carburetors
  7. Trouble shooting - service - maintenance
- E. LP Gas Fuel Systems
  1. Facts about LP gas fuel
  2. Fuel tanks, valves, and gauges
  3. Fuel strainers
  4. Converters
  5. Carburetors
  6. Trouble shooting and service
- F. Diesel Fuel Systems
  1. Fuel tanks
  2. Fuel lines and gauges
  3. Fuel transfer pumps
  4. Fuel filters
  5. Fuel injection systems
  6. Injection pumps
  7. Injection nozzles
  8. Combustion chambers
  9. Problems of diesel combustion
  10. Trouble shooting and service
- G. Intake and Exhaust Systems
  1. Air cleaners
  2. Intake manifolds
  3. Exhaust manifolds
  4. Superchargers
  5. Turbochargers
  6. Testing and servicing systems
- H. Lubrication Systems
  1. Types of systems
  2. Oil pumps
  3. Oil filters
  4. Lubricating valves
  5. Oil coolers
  6. Contamination of oil
  7. Consumption of oil
  8. Crankcase ventilation
  9. Servicing the system
- I. Cooling Systems
  1. Types of systems
  2. Radiators
  3. Fan and fan belt
  4. Water pumps
  5. Thermostats
  6. Coolant
  7. Servicing the system
- J. Governing Systems
  1. Features of governors
  2. Governing of spark-ignition engines
  3. Governing of diesel engines
  4. Malfunctions of governors
- K. Engine Testing, Diagnosis, and Tune-up
  1. Testing tools and servicing tools
  2. Testing the engine
  3. Dynamometer test
  4. Detailed tune-up procedures
- L. Electricity - How It Works
  1. The nature of electricity
  2. What is electricity
  3. Basic electrical circuits
  4. Three types of electrical circuits
  5. Measuring current, voltage, and resistance
  6. Conductors
  7. Semiconductors
  8. Magnetism
  9. Electromagnetism
  10. Electromagnetic induction
  11. Capacitors

- M. Testing Tools and Equipment
    1. Use of test meters
    2. Basic testing of circuits
    3. Testing tools and equipment
- N. Storage Batteries
    1. What a battery does
    2. How a battery is constructed
    3. How a battery works
    4. The battery and the charging circuit
    5. Types of batteries
    6. Testing the battery
    7. Charging the battery
    8. Balancing batteries
    9. Capacity rating of batteries
    10. Battery removal and installation
    11. What affects battery life
    12. Safety rules for batteries
- O. Charging Circuits
    1. Operation of the charging circuit
    2. Generators
    3. Generator regulators
    4. Alternators
    5. Alternator regulators
    6. Testing and diagnosing the charging circuit
- P. Starting Circuits
    1. How the starting circuit works
    2. Starting motors
    3. Starting motor circuits
    4. Starting motor switches
    5. Starting motor drives
    6. Complete starting circuits
    7. Testing and diagnosing the starting circuit
    8. Testing and servicing starting motors
- Q. Ignition Circuits
    1. How the ignition circuit works
    2. Coils
    3. Condensors
    4. Distributors
    5. Spark plugs
    6. Testing, diagnosing and servicing the ignition circuit
- R. Lighting and Accessory Circuits
    1. Lighting circuits
    2. Wiring harnesses
    3. Electromagnetic clutches
    4. Gauges
    5. Meters
    6. Horns and buzzers
    7. Relays
    8. Solenoids
    9. Switches
    10. Electric motors
    11. Flame rods
    12. Transformers
    13. Glow plugs
- S. General Maintenance
    1. Storage batteries
    2. D.C. charging circuits
    3. A.C. charging circuits
    4. Starting circuits
    5. Ignition circuits
    6. Wiring
- T. Power Trains - How They Work
    1. How a power train works
    2. How power is transmitted
    3. Friction drives
    4. Gear drives
    5. Fluid drives
    6. Gears
    7. Gear types
    8. How planetary gears work
    9. Gear wear
    10. Bearings
    11. Adjusting the gear train
- U. Clutches
    1. Types of clutches
    2. Disk type clutches
    3. Plate type clutches
    4. Band type clutches
    5. Overrunning clutches
    6. Magnetic clutches
    7. Cone type clutches
    8. Expanding shoe clutches
    9. Pneumatic clutches
    10. Hydraulic clutches
    11. Clutch operating mechanisms
    12. Dampeners
    13. General maintenance
    14. Trouble shooting
- V. Mechanical Transmissions
    1. Sliding gear transmissions
    2. Collar shift transmissions
    3. Synchromesh transmissions
    4. Shift controls
    5. Adjustments
    6. General mantenance
    7. Trouble shooting
- W. Hydraulic Assist Transmissions
    1. Countershaft transmissions
    2. Planetary transmissions
    3. Hydraulic shift controls
    4. Trouble shooting
- X. Hydrostatic Drives
    1. How hydrostatic drives work
    2. Theory of hydrostatic drives
    3. Types of hydrostatic drives
    4. Operation of hydrostatic drives
    5. Hydrostatic drive axles
    6. Other types of hydrostatic drives
    7. Maintenance
    8. Testing
    9. Trouble shooting
- Y. Torque Converters
    1. How they work
    2. Oil flow in converter
    3. Torque converter transmissions
    4. Trouble shooting
    5. Testing
- Z. Differentials
    1. Operation

  2. Differential locks
  3. Adjustments
  4. Trouble shooting
- AA. Final Drives
  1. Straight axle drives
  2. Pinion drives
  3. Planetary drives
  4. Chain final drives
  5. Maintenance
  6. Adjustments
- BB. Power Take-Offs
  1. Types of PTO'S
  2. Operation of PTO'S
  3. PTO drives
  4. Standards for PTO drives
  5. Servicing
  6. Safety rules
  7. Trouble shooting
- CC. Special Drives
  1. Belt drives
  2. Chain drives
  3. Gear drives
  4. Reciprocating drives
  5. Safety release mechanisms
  6. Slip clutches
  7. Jump clutches
  8. Shear pins
- DD. Hydraulics - How It Works
  1. Basic principles of hydraulics
  2. How a hydraulic system works
  3. Comparing open- and -closed center systems.
  4. Variations on open - and - closed center systems
  5. Uses of hydraulics
- EE. Hydraulic Pumps
  1. Displacement of pumps
  2. Types of pumps
  3. Gear pumps
  4. Vane pumps
  5. Piston pumps
  6. Pump efficiency
  7. Pump failures and remedies
- FF. Hydraulic Valves
  1. Relief valves
  2. Pressure reducing valves
  3. Pressure sequence valves
  4. Unloading valves
  5. Check valves
  6. Rotary valves
  7. Spool valves
  8. Flow control valves
  9. Flow divider valves
  10. Miscellaneous valves
  11. Valve failures and remedies
- GG. Hydraulic Cylinders
  1. Piston cylinders
  2. Vane cylinders
  3. Maintenance of cylinders
- HH. Hydraulic Motors
  1. Gear motors
  2. Vane motors
  3. Piston motors
  4. Motor efficiency
  5. Motor failures and remedies
- II. Hydraulic Accumulators
  1. Uses of accumulators
  2. Pneumatic accumulators
  3. Weight loaded accumulators
  4. Spring loaded accumulators
- JJ. Hydraulic Filters
  1. How and why filters are used
  2. Types of filters
  3. Contamination
  4. Maintenance of filters
- KK. Reservoirs, Oil Coolers, Hoses, Pipes, Tubes and Couplers
  1. Reservoirs
  2. Coolers
  3. Hoses
  4. Pipes and tubes
  5. Quick disconnect couplers
- LL. Hydraulic Seals
  1. Uses of seals
  2. Types of seal
  3. Seal failures and remedies
- MM. Hydraulic Fluids
  1. Properties of fluids
  2. Maintenance of fluids
  3. Keeping fluids clean
- NN. General Maintenance
  1. Cleanliness
  2. Cleaning and flushing systems
  3. Preventing leaks
  4. Preventing overheating
  5. Preventing air-in-oil problems
  6. Checking system before operation
  7. Safety rules
- OO. Diagnosing and Testing of Hydraulic Systems
  1. Basic steps
  2. Testing the machine
  3. Trouble shooting and servicing
- PP. Tractor Cleaning Procedures
  1. Steam
  2. Degreasers
  3. Importance of regular tractor cleaning.
- QQ. Selecting Tractors
  1. Power requirements
  2. Costs
  3. Options
  4. Tractor test analysis - Nebraska tests
  5. Adaptability
- RR. Tractor Gauges
  1. Interpretations from Operators Manual
- SS. Tractor Adjustments - Check Operators Manual
  1. Seats
  2. Wheels
  3. Weights

TT. Safe Tractor Operation - Check Operators Manual
   1. Pre-starting procedures
   2. Starting procedures
   3. Tractor operation in the field
   4. Hitching - unhitching
   5. Safe highway operation
   6. Refueling tractors
   7. Safe tractor operator's contest

IV. Motivation

A. Field trip to implement dealer
B. Slides, filmstrips, transparencies on farm tractors
C. Students' tractors worked on in the laboratory
D. Tractor trouble shooting contest
E. Safe tractor operator program
F. Bulletin Board displays

V. Learning Activities

A. Occupational experience programs
B. Perform tractor servicing jobs.
C. Tractor trouble shooting procedures
D. Safe tractor driving program

VI. Materials Needed

A. Books
   1. Audel's Diesel Engine Manual - 3rd Edition - National Farm Book - 1964
   2. Audel's Gas Engine Manual - 2nd Edition - National Farm Book - 1977
   3. Diesel & High Compression Gas Engines - 3rd Edition - Kates and Luck. American Technical Society - Chicago, Illinois
   4. Farm Gas Engines & Tractors - Jones 1973 - National Farm Book Co.
   5. Light Utility Tractor Service Manual - 1st Edition - Volume I & II (Liquid Cooled Engines Under 35 H.P.) - Technical Publications Division. P.O. Box 12901 - Overland Park, Kansas - 66212
   6. Machines for Power Farming - Stone & Gulvin - Wiley & Sons. 1979
   7. Modern Farm Power - Promersberger, Priebe, Bishop - Reston Publishing Co. - Reston, Va. 1979
   8. Small Tractor Service Manual - 4th Edition - Volume I & II Technical Publications - Overland Park, Kansas 66212

B. Shop Manuals
   1. I & T Shop Service - Technical Publications Division - Intertec Publishing Corporation, P.O. Box 12901, Overland Park, Kansas (Manuals of all makes and models of tractors current today)
   2. Tractor manuals from dealers or maufacturer's

C. Soft-Cover Books from Deere & Co. Moline, Illinois
   1. Fundamentals of Service - Electrical Systems
   2. Fundamentals of Service - Engines
   3. Fundamentals of Service - Hydraulics
   4. Fundamentals of Service - Power Trains

D. Booklets, Pamphlets
The following are available from AAVIM - Athens, Georgia
   1. Selecting & Storing Fuels & Lubricants - 1973
   2. Tractor Electrical Systems
   3. Tractor Maintenance - Principals & Procedures - Teachers Guide & Student Workbook - 1975
   4. Tractor Transmissons
   5. Specifications for Tune-up and Service of Farm Tractors - 1979
   6. Understanding & Measuring Power - 1978

The following are available from Deere & Co. - Moline, Ill.
   1. Air Conditioning
   2. Fuels, Lubricants, and Cooling

D. Booklets, Pamphlets - Con't.
The following are available from Hobar Publishing Co. - St. Paul, Minn.
   1. Alternator Testing & Service
   2. Battery Service & Maintenance
   3. Engine Cooling Systems
   4. Engine Service & Maintenance Worksheets
   4. Testing the Ignition System

The following are available from Iowa State University, Ames, Iowa
   1. Electrical Systems for Spark Ignition Tractors
   2. Individual Study Guide on Carburetors

The following are available from Vo-Ag Service, College of Agriculture, 434 Mumford Hall, University of Illinois, Urbana, Illinois
   1. Electrical Fundamentals Useful in Engine Analysis
   2. Engine Compression & Cylinder Leakage Testing
   3. Farm Tractor Tune-up
   4. Preventing Tractor Overturns

    5. The Engine Cooling System
    6. The Ignition System - Testing & Analyzing Test Results
    7. The Spark Plug - Operation, Selection, & Maintenance
    8. The Storage Battery

E. Films:

The following films are available from Allis Chalmers

1. More Power on the Ground
2. Roar of Power

The following films can be purchased from Deere & Co., or may be available from your Vo-Tech School, or CESA

1. Clean Air that Engines May Live
2. Clean Fuel That Engines May Live
3. Efficient Cooling Systems That Engines May Live
4. Function of Lubrication That Engines May Live

TURF MANAGEMENT

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with the current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement, and other factors relative to potential employment in the turf industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Be able to explain the difference between turf and lawn.
C. Identify the major parts of a turf plant.
D. List the major northern and southern grass species.
E. Identify the different turf grass species.
F. Explain the factors that determine the suitability of a grass species.
G. Identify the major parts of a grass seed.
H. Find and record the following information from a grass seed label:
    1. Kind of grass in the package
    2. Percent of germination
    3. Date of testing
    4. Percentage of weed seeds and inert matter
    5. Pure live seed
    6. Noxious weeds
I. Give recommendations for turf grass mixes for different areas.
J. Determine seeding rates.
K. Explain the factors of soil that determine how good grass will grow in that area.
L. Calculate the amount of N, P and K in different bags of fertilizers.
M. Distinguish between a complete and incomplete fertilizer.
N. List the forms lime can be purchased as and calculate how much it would take per 1000 sq. ft. to change the pH to the desired level.
O. List the steps that should be taken when establishing a lawn by seed.
P. List the steps that should be taken when establishing a turf area by sod.
Q. Calculate how much it would cost to sod 1000 sq. ft. at current market prices.
R. Explain how to establish turf areas by vegetative means other than sod.
S. Determine the fertilization rate for different turf areas and grass species.
T. Explain the factors that will determine how much water an area will need.
U. Demonstrate how to calculate the amount of water that is being used.
V. Explain the ways that weeds reproduce and their life cycles.
W. Be able to identify the major turf weeds in your area.
X. Identify the major turf diseases in your area and recommend control measures.
Y. Identify the major turf insects in your area and recommend control measures.
Z. Demonstrate in the field the proper calibration and/or operation of the following turf equipment:
    1. Fertilizer spreaders (Cyclone, drop,)
    2. Mowers (rotary, reel)
    3. Sod cutter
    4. Aerifing machine
    5. Sprayers
    6. Rototillers

II. Concepts to Develop

A. There are career opportunities in the turf industry for young men and women at all levels of educational preparation.
B. Each turf grass species has certain physical and environmental characteristics.
C. The environmental characteristics of a turf grass species must be considered for proper management.
D. A grass seed label has much information that should be understood.
E. The major ways of establishing turf grass areas in the northern part of the country is by sodding and seeding.
F. Specific steps should be followed when establishing a new turf grass area.

G. To properly maintain a turf grass area the following knowledges and skills must be practiced:
  1. Mowing
  2. Fertilization
  3. Dethatching
  4. Aeration
  5. Weed control
  6. Insect control
  7. Disease control
  8. Watering

III. Subject Matter to Teach

A. Careers
  1. Occupation or job titles
  2. Type and level of education required
  3. Working conditions
  4. Personal qualifications needed
  5. Employment opportunities
  6. Scope of turf industry - local - state - national

B. Introduction to turf
  1. What is turf
  2. What is a lawn
  3. Development of the turf industry
  4. Importance of turf grass management

C. Parts of the grass plant
  1. Roots
  2. Stems
  3. Stolons
  4. Rhizomes
  5. Leaves
  6. Crown
  7. Tiller
  8. Ligule
  9. Auricle
  10. Sheath
  11. Inflorescence
  12. Node

D. Turf Grass Species
  1. Northern species
    a. Kentucky Bluegrass
    b. Red Fescue
    c. Chewing Fescue
    d. Tall Fescue
    e. Colonial Bentgrass
    f. Creeping Bentgrass
    g. Annual Ryegrass
    h. Perennial Ryegrass
    i. Merion Bluegrass
  2. Southern species
    a. Bermudagrass
    b. Zoysia
    c. Centepedigrass
    d. Bahiagrass
    e. Buffalograss
    f. Carpetgrass

E. Factors that determine suitability of turf grass species
  1. Light
  2. Climate
  3. Soil
  4. Water
  5. Temperature

F. The grass seed
  1. Seed coat
  2. Endosperm
  3. Embryo

G. Grass seed labels
  2. Species, variety, strain
  2. Purity
  3. Weed seeds
  4. Noxious weed seeds
  5. Inert matter
  6. Crop
  7. Germination
  8. Seed treatment

H. Turf grass mixtures
  1. Lawns
    a. Shady
    b. Sun
  2. Heavy duty areas
  3. Sloping areas
  4. Temporary use

I. Seeding rates
  1. Mix
  2. Species

J. Soils
  1. Texture
  2. Structure
  3. Aeration
  4. Organic matter
  5. Structure

K. Fertilizers
  1. Forms of nitrogen
    a. Synthetic inorganic
    b. Synthetic organic
    c. Natural organic
  2. Sources of phosphorus
    a. Rock phosphate
    b. Bone meal
  3. Sources of potassium
    a. Potash
    b. Potassium chloride
  4. Micronutrients
  5. Secondary nutrients

L. Types of fertilizers
  1. Complete
  2. Incomplete

M. Lime
  1. Soil pH.
  2. Forms of lime
    a. Gypsum
    b. Dolomite
    c. Calcite
  3. Rate and application

N. Steps in establishing a lawn by seeding
  1. Rough grading
  2. Drainage
  3. Improving or adding soil
  4. Seedbed cleaning
  5. Liming and fertilizing

    6. Final grade
    7. Starter fertilizer
    8. Seeding
    9. Mulching
    10. Watering
    11. First mowing

O. Steps in establishing a lawn by sodding
    1. Rough grade
    2. Drainage
    3. Improving or adding soil
    4. Seedbed cleaning
    5. Liming and fertilization
    6. Final grade
    7. Sodding
    8. Watering
    9. First mowing

P. Establishing lawns by other vegetative means
    2. Plugging
    2. Stolonization
    3. Sprigging

Q. Maintenance fertilization
    1. Rates
        a. Soil test
        b. Turf species
        c. Fertilizer companies suggested rate
    2. Time of application
        a. Spring
        b. Summer
        c. Fall
    3. Spreaders
        a. Drop
        b. Cyclone

R. Watering lawns
    1. Amount of water needed
        a. Turf grass species
        b. Climate
        c. Time of year
        d. Soil
    2. Irrigation systems
        a. Permanent systems
        b. Portable
    3. Time of watering

S. Mowing
    1. Height of mowing
    2. Frequency of mowing
    3. Clippings
    4. Mowers
        1. Rotary
        2. Reel
        3. Sickle bar
    5. Chemical mowing

T. Renovation of lawns
    2. Dethatching
    2. Aerifing
    3. Overseeding
    4. Topdressing
    5. Vertical cutting
    6. Colorants

U. Lawn Weeds
    1. Definition of a weed
    2. Reproduction
        a. Sexual
        b. Asexual
    3. Life cycles
        a. Annuals
        b. Biennials
        c. Perennials
    4. Vegetative characteristics
        a. Barnyardgrass
        b. Annual bluegrass
        c. Crabgrass
        d. Tall fescue
        e. Foxtail
        f. Quackgrass
        g. Goosegrass
        h. Bindweed
        i. Chickweed
        j. Blackseed Plantain
        k. Dandelion
        l. Dock
        m. Henbit
        n. Purslane
        o. Knot weed
        p. Other

V. Lawn weed control
    1. Mechanical
    2. Proper turf management
    3. Herbicides
        a. Contact
        b. Systemic
        c. Preemergent
        d. Postemergent
    4. Physical forms of fertilizers
        a. Liquid
        b. Granular
        c. Wax bars
        d. Powder (WP)

W. Lawn diseases
    1. Causing organisms
    2. Infectious and non-infectious
    3. Control
        a. Good cultural practices
        b. Fungicides
    4. Types
        a. Brown patch
        b. Dollar spot
        c. Blights
        d. Snow molds
        e. Powdery mildew
        f. Other

X. Lawn Insects
    1. Types
        a. Leaf feeders
        b. Root feeders
    2. Control
        a. Good cultural practices
        b. Insecticides
    3. Types
        a. Grubs
        b. Chinch bugs
        c. Billbugs
        d. Wireworms

        e. Cutworms
        f. Armyworms
        g. Other

IV. Motivation

- A. Field trips to:
    - 1. Turf plots
    - 2. Athletic fields
    - 3. Golf courses
    - 4. Sod farms
- B. Films, Film Strips and Slides on:
    - 1. Turf careers
    - 2. Turf areas
    - 3. Golf courses
    - 4. Weeds
    - 5. Diseases
- C. Resource speakers
- D. Bulletin board displays

V. Learning Activities

- A. From an index of job titles prepare a list of occupations in the turf industry job cluster nationwide, statewide and local.
- B. Do a job interview
- C. Use a stereoscope microscope or hand lens and dissect a grass plant identifing the major grass plant parts.
- D. Take a wedge of sod from different areas of a lawn and identify the different grass species.
- E. Dissect a grass seed.
- F. From a grass seed package label determine the following:
    - 1. Kind of grass in the package
    - 2. Percent of germination
    - 3. Date of testing
    - 4. Percent of weed seeds and inert matter
    - 5. Pure live seed
    - 6. Noxious weeds
- G. List different grass seed mixes for different areas.
- H. Calibrate a spreader for different types of seeds.
- I. Explan how to modify the soil for a turf area.
- J. Explain the advantages and disadvantages of the different forms of fertilizers.
- K. Compare brands of fertilizers
- L. Calculate the weight of each element in different bags of fertilizer.
- M. Calculate how much lime it would take to modify the pH of the soil.
- N. Seed an area of lawn around the school.
- O. Sod an area of lawn around the school.
- P. Calculate the cost of sodding an area.
- Q. Calculate the cost of seeding an area.
- R. Calculate how much it would cost to add 1 inch of top soil to an area.
- S. Participate in a plugging, sprigging and stolonization exercise.
- T. Calibrate a cyclone and drop spreader for different types of fertilizers.
- U. Set up a sprinkling system and calculate the amount of water used in an hour.
- V. Adjust the height of different lawn mowers.
- W. Operate a:
    - 1. Sod cutter
    - 2. Aerifier
    - 3. Sprayers
    - 4. Rototillers
- X. Make pressed specimens of different types of lawn weeds and identify them.
- Y. Set up plots comparing different types of herbicides.
- Z. Identify lawn diseases.
- AA. Collect various lawn insects.
- BB. Develop recommendations for improvement of poor turf areas.

VI. Materials Needed

- A. Books
    - 1. Crocket. *Lawns and Ground Covers.* Time-Life Books. 1971
    - 2. Editors of Sunset Books. *Lawns and Ground Covers.* Lane Publishing Company
    - 3. Scotts Co., *Scott's Technical Institute Manual.* O.M. Scotts and Son. 1978
    - 4. Sprague. *Turf Management Handbook.* Interstate Publishers and Printers. 1976
    - 5. Vengris. *Lawns.* Thomas Publications. 1973
    - 6. United States Dept. of Ag. *Common Weeds of the United States.* Dove Publications. 1971
- B. Bulletins and Pamphlets (University of Wisconsin-Extension)
    - 1. Lawn Weeds and Their Control. A811 1111
    - 2. Turf Pest Control Guide. A2934
    - 3. Care and Sharpening of Lawn and Garden Tools. A2683
    - 4. Powdery Mildew on Ornamentals and Turf. A2404
    - 5. Lawn Fertilization. A2303
    - 6. Ground Covers for Wisconsin. A2017
    - 7. Identifying Grasses in Wisconsin Turf. A1827
    - 8. Growing Ground Covers. AG175
    - 9. How to Buy Lawn Seed. AG169
    - 10. Lawn Diseases and How to Control Them. AG 61
    - 11. Lawn Insects - How to Control Them. AG 53

12. Better Lawns, Establishment, Maintenance, Renovation - Lawn Problems - Grasses. Ag 51

C. Slides and Film Strips
  1. University of Illinois
     Lawn Weeds
     Steps to a Better Lawn
     Seed Structure and Identification of Cool Season Grasses
  2. University of Ohio
     Lawn Care and Management
     Lawn Renovation and Reestablishment
     Turf Diseases of the Midwest
  3. Penn State
     Exploring Turfgrass Occupations
     Turf Grass Identification
     Types of Turf
     Weed Identification
  4. California Polytechnic State University
     Lawns and Ground Covers

D. Laboratory Manuals
  1. Penn State Department of Ag. Ed., *Turf Grass Maintenance and Establishment*. Pennsylvania State University. 1968
  2. Williams. *Nursery Crops and Landscape Design*. Interstate Publishers and Printers. 1975

E. Worksheets
   Pace Productions, Inc.
   Sharpening a Rotary Mower Blade
   Sharpening and Adjusting Grass Shears

VEGETABLE CROPS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditins, opportunity for advancement and other factors relative to potential employment in the commercial production of vegetable crops and will be able to relate these factors to his/her own specific needs and aspirations.

B. Locate the significant vegetable crop producing regions of the United States and Wisconsin, both for the fresh market and the processing market.

C. Relate the importance of the canning industry and the fresh market industry in Wisconsin in terms of dollar volume and production levels expressed as gross data and as a percent of the national output.

D. Group the opportunities in the canning and the fresh market industry according to production phase, competency level, and degree of training and work experience required.

E. Provide a written description of the physio-chemical requirements of the most desirable soil for each given list of vegetables.

F. List and discuss the typical kinds of soil erosion, the factors influencing it and the methods of control.

G. Differentiate among the kinds of soil moisture and be able to describe how it is lost from the soil.

H. Collect representative soil samples under actual field conditions, submit these to a laboratory for analysis, interpret the analysis and write out the appropriate soil management practices.

I. List the three basic fertilizing elements, common sources of each, and describe how they are formulated and applied.

J. List and discuss the three essential phases of plant growth and development.

K. Distinguish between monocotyledonous and dicotyledonous vegetable crop seeds and identify their parts and explain the functions of each.

L. Discuss the four basic conditions necessary for seed germination.

M. Describe and be familiar with the requirements for each of the basic plant processes.

N. Identify the type of flower, the parts of the flower, and discuss the functions of each part in the reproductive process.

O. Develop a written plan for seedbed preparation, planting, and cultivation of selected vegetable crops.

P. Classify weeds common to Wisconsin according to type, identify them by name and develop a written program for their control.

Q. Classify and identify insects (common to vegetable crops in Wisconsin) and develop a written program for their control.

R. List the diseases common to particular vegetable crops and be familiar with the methods for their control.

S. Describe the conditions that determine the time of harvest, the methods of harvest, and the precautions to observe in preventing injury to specific vegetable crops.

T. List and discuss the methods and length of time that fresh market vegetables may be stored.

U. Identify and be familiar with the methods of transportation for processing and fresh market vegetables in relation to economics, perishability and care of handling.

V. Be familiar with the locations of processing plants and the specific vegetables that they process.

W. Be familiar with the locations and the most feasible types of markets available to market fresh vegetables.

II. Concepts to Develop

A. There are career opportunities in the production of vegetable crops for young men and women at all levels of educational preparation.

B. The vegetable industry contributes significantly to the state and national economy.

C. Vegetable production is concentrated in the lake and coastal states.

D. Most of Wisconsin soils and climate can produce vegetables, but certain parts of the state are more ideal for certain specific crops.

E. The increasing volume of food production has direct implications on the labor force.

F. The selection of soil type and appropriate management and cultural practices will vary with the individual vegetable crop.

G. The growth of plants consists primarily of cell development, enlargement and maturation.

H. All seeds may be classified as monocotyledonous or dicotyledonous, each having distinctive seed parts, but the germination and plant processes of all are influenced by common conditions.

I. The cultural practices for different vegetable crops will vary in different sections of the country according to climate, soil type, availability of labor, methods of harvest, types of markets, the demands of the processor and consumer, plus other minor factors.

J. The identification of weeds and their methods of reproduction are basic to selecting the appropriate method of their control.

K. The fundamental principles of insect and disease control are exclusion, eradication, protection and immunization.

L. Time and method of harvest will vary according to the type of vegetable crop, availability of labor, type and cost of equipment and the type and location of the market used.

M. The principles of vegetable production in Wisconsin are applied to the commercial production of peas, beets, sweet corn, snap beans, potatoes, cabbage, cucumbers, tomatoes, melons, peppers and head lettuce.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job descriptions
  3. Training requirements
    a. Length of time
    b. Cost
  4. Working conditions.
  5. Opportunity for advancement
  6. Other factors relating to student needs and aspirations.

B. Occupations
  1. Production.
  2. Harvesting.
  3. Processing.
  4. Marketing.
  5. Engineering.

C. Scope and economic importance
  1. Foreign.
  2. National.
  3. State.
  4. Local area.
  5. Vegetable crop statistics.

D. Choosing a soil
  1. Physical requirements.
  2. Chemical requirements.
  3. Capability of specific crop adaption.

E. Conserving soil and moisture
  1. Types of erosion
    a. Water.
    b. Wind.
  2. Factors influencing soil erosion
    a. Nature of soil structure and texture.
    b. Climate.
    c. Vegetative cover.
    d. Slope.
    e. Land use.
  3. Erosion control methods
    a. Management practices
      1) Use of land.
      2) Water disposal systems.
      3) Cover crop.
      4) Fertilizer and lime use.
      5) Gully control.

- b. Mechanical practices
  - 1) Terracing.
  - 2) Strip cropping.
  - 3) Crop rotation.
  - 4) Water outlets.
  - 5) Diversion.
  - 6) Row direction.
- 4. Kinds of losses of soil water
  - a. Kinds of soil water.
    - 1) Capillary.
    - 2) Hydroscopic.
    - 3) Gravitational.
  - b. Estimating soil water.
  - c. Ways soils lose water.
    - 1) Surface run off.
    - 2) Evaporation.
    - 3) Transpiration.
    - 4) Percolation.
- 5. Soil sampling and testing
  - a. Proper time to take samples.
  - b. Proper procedure in taking samples.
  - c. Interpreting an information sheet.
  - d. pH testing.
  - e. NPK testing.
  - f. Organic matter content.
  - g. Minor elements.
- 6. Using fertilizers
  - a. Analysis formula and ratios.
  - b. Nutrient requirements for vegetable crops.
  - c. Application of fertilizer.
    - 1) Purposes.
    - 2) Common types of fertilizers used.
      - a) Commercial (liquid and dry).
      - b) Animal manure.
      - c) Green manures and crop residue.
    - 3) Time of application.
    - 4) Methods.
      - a) Broadcast
      - b) Drilled in
      - c) Foliar (sprayed or irrigation)
      - d) Side dressed
      - e) Knifed in

F. Plant structure-function of plant parts
- 1. Comparision of plants and animals.
- 2. Plant cells.
- 3. Roots.
- 4. Stems.
- 5. Leaves.

G. Seed germination
- 1. Functions of the seed.
- 2. Comparing dicotyledonous and monocotyledonous seeds
- 3. Conditions necessary for germination.
  - a. Proper moisture.
  - b. Proper temperature.
  - c. Proper oxygen.
- 4. Conditions that affect germination.
- 5. Seed dormancy.

H. Plant processes
- 1. Photosynthesis.
- 2. Absorption.
  - a. Diffusion.
  - b. Osmosis.
- 3. Distribution.
- 4. Respiration.
- 5. Transpiration.
- 6. Use of plant food.
- 7. Storage of plant food.
  - a. Annuals.
  - b. Biennuals.
  - c. Perennials.

I. Plant propagation and improvement
- 1. Sexual reproduction.
  - a. Floral parts and their functions.
  - b. Types of flowers.
  - c. Pollination.
  - d. Fertilization.
- 2. Asexual reproduction.
  - a. Specific crops.
  - b. Economics of reproduction.
- 3. Genetic improvement.
  - a. Cells, chromosomes and genes.
  - b. Segregation and recombination.
  - c. Variations.
  - d. Ways of improvement of varieties.

J. Land preparation
  - a. Tillage of.
  - b. Disposing of crop residue.
  - c. Characteristics of good seed bed preparation.
    - 1) Based on each specific crop.
    - 2) Based on the economics of production.
  - d. Types of implements used in seedbed preparation.

K. Planting
- 1. Selecting the seed.
  - a. Importance of good seed.
  - b. Characteristics of good seed.
  - c. Testing seed germination.
- 2. Equipment and methods of planting.
  - a. Types of planting equipment.
  - b. Methods of planting.

- c. Planting and harvesting dates.
  - 1) Market price and availability.
  - 1) Climate.

L. Cultivation
- 1. Advantages and disadvantages.
  - a. Costs-time, labor, equipment.
  - b. Affecting plant growth.
- 2. Time-in relation to effectiveness.
- 3. Effective methods.

M. Irrigation
- 1. History—past to present time.
- 2. Methods of irrigation
  - a. Sprinkler (portable, stationary and self-mobilized).
  - b. Surface (trench or flooding).
  - c. Trickle.
  - d. Sub-surface.
- 3. Sources of water available.
  - a. Cost.
  - b. Ease of use.
  - c. Government and industry regulations.
- 4. Critical periods of use.
- 5. Weighing the economics of irrigation in relation to costs of crop production, market price received and increase in volume and quality of the specific crop grown.

N. Weed identification
- 1. Annual.
- 2. Biennial.
- 3. Perennial.

O. Methods of weed control.
- 1. Mechanical
  - a. Type of equipment to use.
  - b. Time that is most effective.
- 2. Chemical
  - a. Safety in handling.
  - b. Chemical laws and regulations
  - c. Rates of application that are effective and economical.
  - d. Time of application to be most effective.
  - e. Calibration of sprayer.

P. Methods of insect control
- 1. Chemical
  - a. Identifying and classifying insects (life cycles and habitat)
  - b. Insecticides and miticides that are effective as well as legal to use.
  - c. Government rules and regulations as to use and application.
  - d. Critical time to use.
  - e. Calibration of sprayer.
- 2. Biological
  - a. Type of effectiveness
  - b. Practicality on a large scale production of vegetable crops.

Q. Methods of disease control
- 1. Identificaton of specific diseases.
- 2. Seed treatments.
- 3. Fungicides.
- 4. Antibiotics.
- 5. Safe handling of chemicals.
- 6. Calibration of sprayers.
- 7. Disease control through crop rotation.

R. Harvesting vegetable crops
- 1. Methods of harvesting.
  - a. Based on use.
    - 1) Fresh market.
    - 2) Processing.
  - b. Type of storage and/or shipping to be used.
  - c. Type of land the vegetable crop is grown on.
  - d. Availability of labor
  - e. Perishability of the crop
  - f. Time of harvest

S. Storage of vegetable crops
- 1. Perishability of the crop
- 2. Location and type of market
- 3. Type of transportation needed or available
- 4. Market price
- 5. Cost factors involved

T. Marketing
- 1. Type and demand of the market or processing plant.
- 2. Distance from the production area.
- 3. Type of transportation available.
- 4. Ability of the producer to also be knowledgeable of the vegetable marketing part of the industry.
- 5. Storage requirements of the vegetable crop, if they exist.

U. Shipping
- 1. Distance of market or processing plant.
- 2. Type of equipment needed for shipping.
- 3. Weighing the costs of hiring or doing your own shipping.

IV. Motivation

- A. Field trip to local canning factory.
- B. Field trip to a wholesale produce warehouse or a large city fresh market.
- C. Visit to a greenhouse that commercially grows vegetables or grows plants for truck gardeners.
- D. Visit experimental and demonstration plots that an area college or experimental station may be growing.

E. Visit area vegetable farms, both the farms growing for processing plants and those growing for the fresh market.
   1. These farms could be visited at planting time, during the growing season, at harvest time and also when preparation for shipping is being made.

F. Bulletin board displays.

G. Observing slides, films and filmstrips.

V. Learning Activities

A. Occupational experience programs.

B. Identifying different vegetables and varieties.

C. Growing vegetables in demonstration plots to show nutrient deficiencies.

D. Experiment with germinating seeds and the conditions that are needed.

E. Actually test soils for acidity and nutrient content.

F. Plan a specific five year vegetable crop rotation for a farm.

G. Identify insects that are common for vegetables grown in our area.

H. Identify various weeds that are common in our production area.

I. Develop a written plan for the commercial production of a vegetable common in your area. This plan should include the type of soil required, plant growth and development, cultural development, pest control, type of harvesting and shipping and a thorough outline of the different types of marketing involved with the production of that crop.

VI. Materials Needed

A. Books
   1. McCollum. *Producing Vegetable Crops.* Interstate 1975.
   2. Donahue, Follett & Tulloch. *Our Soils and Their Management.* Interstate 1976.
   3. Mortenson. *Modern Marketing of Farm Products.* Interstate 1977.
   4. Westcott. *Plant Disease Handbook.* Van Nostrand Co. 1971.
   5. Jaques. *How to Know The Insects.* William C. Brown Co. 1947.
   6. Libby. *1971Insect and Disease Control on Vegetables.* University of Wisconsin-Extension.

B. Bulletins and Pamphlets
   1. "1979 Weed Control Manual." A Meister Publication, Willoughby, Ohio.
   2. "Vegetable Identification." California State Polytechnic College, San Luis Obispo, California.
   3. "Fruit and Vegetable Processing Jobs." Wisconsin State Employment Service, Occupational Analysis Field Center, Madison, Wisconsin.
   4. The following bulletins are available from the University of Wisconsin-Extension...Catalogue no. J7CAAG

A2809..	"Soil Test Recommendations For Field and Vegetable Crops." 1976.
R2960..	"Irrigation in The Central Sands of Wisconsin." 1978.
R2820..	"Agricultural Market Information." 1978
A1626..	"Considering Irrigation? Here's How to Make an Economic Analysis of a Proposed Irrigation System." 1978.
A8MIE941..	"Computing Production Costs of Fruits and Vegetables." 1976.
A2093..	"Vegetable Insects." 1975.
A2348..	"Vegetable Disease Control-Fungicide Application." 1976

   ***There are many other bulletins that are special for each specific vegetable crop.

   5. "The (Chicago) Packer." A weekly paper that gives a very thorough analysis of the present market and production, plus a very accurate short range projection of price and production of vegetables throughout the United States.

C. Films
   1. "Vegetables For All Seasons"; Viewing vegetables from the standpoint of the producer, retailer and consumer. 1972, 9392 BAVI.
   2. "Adventures in Agriculture—Automated Packing Houses." Package Research Library, 21 Pine, Rockaway, New Jersey 07866.
   3. "Vegetable Insects." 2345 BAVI.
   4. "The Insect Alternative"; Pest management through the use of natural enemies and chemicals that alter insect behavior. (Time-Life Series, 1978. 2490 BAVI.

5. "Vegetable Insect Control." Chevron Chemical Company, Ortho Division, 200 Bush Street, San Francisco, Calif. 94104.
6. "Safe Use of Pesticides." 5688 BAVI.
7. "Head Lettuce in Wisconsin: Promise and Problems of a New Specialty Crop." 5690 BAVI.
8. "Wisconsin's Central Sands." (Irrigation) BAVI.

WEED IDENTIFICATION AND CONTROL

I. Performance Objectives

Upon completion of this unit the student will be able to:

- A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in weed control and will be able to relate these factors to his/her own specific needs and aspirations.
- B. Develop a list of detrimental effects of weeds on crop production.
- C. Describe the aesthetic effects of weeds.
- D. Identify weeds common to Wisconsin.
- E. Identify weed seeds common to Wisconsin.
- F. Define terms used in the classification of weeds.
- G. List examples of weeds in the various weed classification categories.
- H. Propose various preventative practices of weed control, such as use of clean seed and caution with custom operators.
- I. Interpret and apply chemical recommendations for specific weed problems.
- J. Recognize when to use mechanical weed control methods.
- K. Define terms relating to time of herbicide application.
- L. Define terms relating to the type of application.
- M. Apply a formula used in calibrating a sprayer.
- N. List the proper steps of safe handling of herbicides.
- O. Interpret the ingredients found on a chemical label.
- P. Interpret and apply noxious weed laws to a local situation.
- Q. Perceive possible affects of herbicides on the environment.

II. Concepts to Develop

- A. There are career opportunities in weed control for young men and women at all levels of educational preparation.
- B. Weed control methods vary in cost and type.
- C. Some types of weeds are termed noxious.
- D. Weeds may be classified using one of several systems.
- E. Herbicides, a type of chemical control, vary in method of application.
- F. All chemicals need safe handling.
- G. Some chemicals may have an undesirable effect on the environment.

III. Subject Matter to Teach

- A. Economics of weed Control
  1. Effect of food supply
  2. Increase production costs
  3. Aesthetic values
  4. Hazard to livestock and man
- B. Weed Identification
  1. Plant identification
  2. Seed identification
- C. Weed Types
  1. Grasses
  2. Sedges and rushes
  3. Broadleaf
  4. Aquatics
  5. Trees and brush
  6. Parasitic plants
- D. Classification of Weeds
  1. Annuals, biennials, perennials
  2. Root systems
  3. Noxious weeds and special laws
- E. Cultural Characteristices of Weeds
  1. Effect of soil condition
  2. Growth habits
  3. Tolerance of weeds
  4. Effects of weather conditions
  5. Response to chemicals
  6. Life cycles
- F. Weed Control Methods
  1. Preventative Practices
     - a. Rotation
     - b. Seed bed
     - c. Prevention from seeding (mowing, etc.)
  2. Chemical
     - a. Types
     - b. Time, type of application
       - 1) Foliage - contact nonselective
         - contact selective
         - systemic nonselective
         - systemic selective
       - 2) Soil - temporary residue nonselective
         - temporary residue selective

      - permanent residue nonselective
      - permanent residue selective
    c. Equipment
    d. Calibration of equipment
  3. Mechanical
    a. Cultivation
  4. Other
    a. Flame
    b. Mulch
    c. Smothering
G. Environmental Effects of Herbicides
H. Careers
  1. Current and future employment needs
  2. Job description
  3. Training requirements
  4. Working conditions
  5. Opportunity for advancement
  6. Other factors relating to student needs and aspirations

IV. Motivation

A. Field trips to collect and identify weeds and weed seeds.
B. Slides and filmstrips relating to weeds and weed seeds.
C. Demonstration on the calibration of a sprayer.
D. Guest speaker concerning related careers.
E. Bulletin board display.
F. Field trips to weed herbicide trials.
G. Films.

V. Learning Activities

A. Weed control measures utilized in occupational experience program.
B. Collect, identify and display weed seeds common to the areas.
C. Calibrate a sprayer.
D. Collect and display labels from herbicide containers.
E. Develop test plots to study the effect of herbicides.

VI. Materials Needed

A. Books
  1. *Common Weeds of the U.S.* — U.S. Department of Agriculture.
  2. *Handbook on Agricultural Occupations.* Interstate.
  3. *Identification and Judging Crops Weeds and Diseases.* Interstate.
  4. *Weeds of North Central States.* Circular 718, University of Illinois. Champaign, Illinois.
  5. Weeds, Yearbook of Agriculture, U.S. Department of Agriculture, 1961.
  6. Illustrated Taxonomy Manual of Weed Seeds. R. J. Delorit, River Falls, Wisconsin, University Press. 1970
  7. Weed Science: Principles & Practices, Klingman, 1975
B. Bulletins and Pamphlets
  1. Berge. "Sprayer Calibration Charts." Agricultural Engineering Department. University of Wisconsin.
  2. Buchholtz and Doersch. "24 of Our Worst Weeds." University of Wisconsin-Extension.
  3. Buchholtz and Peterson. "Weed Control in Field Crops." Cir. 447 University of Wisconsin-Extension.
  4. Catalog 35, "Agricultural Spray Nozzles." 3201 Randall St. Bellwood, Illinois. 60104.
  5. "Farm Chemical Manual." Standard Oil Division. American Oil Co.
  6. "General Farm Use of Pesticides." Wisconsin Statistical Reporting Service, Box 156, Madison, Wisconsin.
  7. "Pesticide Lesson Plans for Vocational Agriculture." Geigy Chemicals.
  8. "Sprayer and Granular Applicator Calibration." Cir. 540. Univ. of Wisconsin-Extension.
  9. "Sprayer Service Letter." University of Wisconsin-Extension.
  10. "Your Guide to Identifying Weeds and Grasses." Elanco Products Co. Eli Division of Indianapolis, Indiana.
  11. "Poisonous Plants of The Midwest", Cir. A81LSP24, University of Wisconsin-Extension
C. Films, Filmstrips and Slides
  1. "A Systematic Approach to Weed Control." NASCO Fort Atkinson, Wisconsin.
  2. "Combating Weeds in Temporary Grazing of Small Grain and Hay." NASCO.
  3. "Crop Weed Slides, Various Assortment." NASCO.
  4. "Identification of Weeds — Part I." NASCO.
  5. "Identification of Weeds — Part II." NASCO.
  6. "Just Weeds." 3138. BAVI. Univ. of Wisconsin-Madison.
  7. "Let's Look at Weeds." 3311. BAVI.

8. "Predict Weed Problems with Weed-Seed Analysis." John Deere Films.

WELDING, ARC

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in the welding industry and will be able to relate these factors to his/her own specific needs and aspirations.
B. Understand safety practices and procedures.
C. Identify different metals and select the correct rod and use techniques to obtain a quality weld.
D. Operate welders with different features and means of adjustment.
E. Comprehend the different ratings used in classifying welders.
F. Select the proper amperage setting when using different diameters of electrodes on varying thicknesses of steel.
G. Contrast A.C. and D.C. welding equipment.
H. Be familiar with the American Welding Society system of classifying electrodes and be able to identify five of the common rods.
I. Comprehend the effect of current settings, length of arc, angle of electrode and speed of travel has on the bead or deposit.
J. Prepare the various thicknesses of carbon steel, and cast iron to secure complete fusion, obtain maximum strength and minimize distortion.
K. Understand the forces of distortion and shrink and employ measures for their control.
L. Weld lap joints, corner joints, butt joints, and edge or flange joints in all positions.
M. Weld "T" joints on the flat or horizontal position.
N. Utilize the carbon arc torch to braze sheet metal, fuse hard facing powder on plow shares and remove rusty nuts from bolts.
O. Pass a certification test on structural steel.
P. Pass a certification test for welding pipe in any axis.
Q. Perform all welding repair jobs on equipment and machinery on the home farm.
R. Successfully perform assigned tasks in any metal fabricating shop and after two weeks of on-the-job instruction, pass whatever certification test is necessary to comply with the welding code and requirements.
S. Choose the correct electrodes to use in welding ferrous and non-ferrous metals.
T. Pierce holes and cut steel plates of varying thicknesses.
U. Understand the advantages and disadvantages of MIG welding.
V. Comprehend the basic principles of operation and their application in MIG welding.
W. Weld lap joints, "T" joints, butt joints, corner joints and edge or flange joints in the flat, horizontal and vertical down position. (MIG WELDING)
X. Understand the basic principles of operation in gas tungsten arc welding.
Y. Comprehend the basic principles of operation and their application in TIG welding.
Z. Choose filler metals to use in welding aluminum, magnesium, stainless steel, copper and copper alloys. (TIG WELDING)
AA. Repair aluminum shovels, elevators, boats and castings of various types. (TIG WELDING)
BB. Repair items manufactured from magnesium including lawn mower decks and ladders. (TIG WELDING)
CC. Weld equipment manufactured from various kinds of stainless steel. (TIG WELDING)
DD. Weld items manufactured from copper and copper alloys. (TIG WELDING)

II. Concepts to Develop

A. There are career opportunities in welding for men and women at various levels of educational preparation.
B. A constant awareness of safety is needed by all persons at all times.
C. Rewards in the welding industry is commensurate with the level of skill obtained and his/her willingness to work.
D. Continual upgrading in knowledge and in skill development may be accomplished by enrolling in evening classes.
E. Attainment of a high level of proficiency contributes significantly to his/her self image.
F. Distortion and shrink can be effectively controlled by a skilled welder.

G. A welder must be certified before being employed on some construction projects.
H. Certain metals and their alloys require a special welding process.
I. Special techniques are utilized when welding various joints in different positions.
J. A person passing a high level of welding skill can command an excellent salary.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement
  6. Other factors relating to student needs and aspirations.

B. Safety
  1. Clothing and shields.
  2. Eye protection.
  3. Safeguarding others.
  4. Keep equipment dry.
  5. Do not operate with welder with cables wrapped around the welder.

C. Advantages of arc welding
  1. Penetration.
  2. Stability of arc.
  3. Ease in starting and maintaining the arc.

D. Types of arc welding machines
  1. Types of arc welding generator units
  2. Transformer type machines.
  3. Dual purpose welders.
  4. Metal inert gas.
  5. Tungsten Inert Gas
  6. Understanding how arc welders operate.

E. Adjusting and starting the arc welding machine
  1. Procedure for adjusting the current.
  2. Inspecton of electrode holder leads and connections.

F. Preparing the metal
  1. Cleanliness.
  2. Mounting.
  3. Identification.
  4. Preparation of metal edges.
  5. Support of pieces to be welded.

G. Selecting the electrode
  1. Chemical composition of coverings.
  2. Composition of electrode metals.
  3. Electrode diameters.
  4. Color codes and numbers.
  5. Variables affecting the choice of electrodes.
  6. Economics.

H. Welding procedure
  1. Striking the arc.
  2. Maintaining the arc.
  3. Stopping the weld.
  4. Restarting the weld.
  5. The forces of distortion and shrink.

I. The carbon arc torch
  1. Adjustments.
  2. Components.
  3. Uses.

J. Identification of iron and steel
  1. Spark test.
  2. Oxyacetylene torch test.
  3. Fracture test.
  4. Color tests.
  5. Ring or sound test.
  6. Magnetic test.
  7. Chip test.

K. Identification of nonferrous metals
  1. Color.
  2. Hardness.

L. Skill development
  1. Prepare metal for welding.
  2. Weld in the flat and horizontal position — "T" joints, lap joints, corner joints, butt joints, edge or flange joints.
  3. Braze sheet metal-Carbon Arc Torch
  4. Fuse hard facing powder on plow shares and cultivator shovels.
  5. Remove a nut from a rusted bolt.
  6. Weld structural steel in the vertical up position.
  7. Technique of "U" or "J" motions or a stringer bead technique.
  8. Fill a one inch "open butt joint."
  9. Sixty degree groove joints.
  10. Lap or "T" joints using thin metals.
  11. Weld structured steel in the overhead position.
  12. Evaluation of welds.
  13. Pipe welding in the vertical and horizontal axis.
  14. Welding aluminum, magnesium, stainless steel, copper and copper alloys.

M. Project activities
  1. Repair of equipment
  2. Project construction.
  3. Blueprint reading.

IV. Motivation—Beginning Welding

A. Films, slides and filmstrips.
B. Charts.
C. Bulletin board displays.
D. Field trip to a manufacturer of welders.

E. Field trip to construction sites to observe welders on the job.

F. Field trip to industries to view factory type welding jobs.

V. Learning Activities

A. Occupational experience program.

B. Identify beads made with a short arc, long arc, high amperage and low amperage.

C. Run a bead.

D. Weld metals of varying thickness in all positions.

E. Repair machinery and equipment.

F. Identify common metals by means of the spark test.

G. Collect, label and display common electrodes used in area industries and schools.

H. Remove a nut from a rusted bolt.

I. Construct steel positioning clamps, steel drain pans, steel saw horses, machinery jacks, steel gates and pens for livestock.

J. Collect, label and display specimens of steel, cast iron, cast steel, stainless steel, aluminum, magnesium, high carbon steel, ductile cast iron, white cast iron, copper brass and bronze, and the electrodes used to weld these metals.

K. Secure price listings to determine what quantities of rods to purchase.

L. Weld in the vertical up position utilizing a weaving or stringer bead technique.

M. Develop the technique of welding a single pass in each quadrant, then two passes over one, then three over two, then four passes over three, then five passes over four.

N. Fill a one inch "open butt joint" eight inches long.

O. Complete a 60 degree groove joint exercise.

P. Complete a lap on "T" joint on metal 3/16" or less.

Q. Complete horizontal welding exercises.

R. Complete exercises of welding structural steel in the overhead position.

S. Complete pipe welding exercise in the vertical and horizontal axis.

T. Construct projects such as an individual calf stall, trailer hitches, wagons and steel inclines for tractors.

U. Repair broken farm machinery, equipment and build up and hard surface worn machine and equipment parts.

VI. Materials Needed

A. Books:

1. Arc Welding Instructions for the Beginner — Sosnin — James F, Lincoln Arc Welding Foundation — Cleveland, Ohio 44117
2. Arc Welding Lessons for School and Farm Shop — James F. Lincoln Arc Welding Foundation — Cleveland, Ohio 44117
3. Arc Welding — Giachino — America Technical Society — Chicago, Ill.
4. Basic Welding Techniques — Griffin — National Farm Book Co.
5. Metals and How to Weld Them — Jefferson and Woods — James F. Lincoln Arc Welding Foundation, Cleveland, Ohio 44117
6. Metals Handbook, 8th Edition, Volume 6, Welding and Brazing, America Society for Metals, Metals Park, Ohio 1971
7. Modern Welding — Althouse, et al — Goodheart—Willcox—South Holland, Illinois. 1976
8. Modern Agricultural Mechanics — Wakeman — Interstate — 1977
9. New Lessons in Arc Welding — James F. Lincoln Arc Welding Foundation
10. Print Reading for Welders — Giachino & Baukema — American Technical Society — Chicago, Illinois
11. Procedure Handbook of Arc Welding — 12th Edition — James F. Lincoln Arc Welding: Foundation — Cleveland, Ohio 44117
12. The Welding Encyclopedia — 17th Edition — Jefferson — Montiello Books, Morton Grove, Illinois. (An answer book is also available)
13. Welding — Principles and Practices — Sacks — Chas. A. Bennett Co. Peoria, Illinois 1976
14. Welding Skills and Practices — Giachino and Weeks — American Technical Society, Chicago, Illinois
15. Welding Handbook — 6th Edition — American Welding Society — 2501 N.W. 7th St. Miami. Florida 33125
    Section 1 Fundamentals of Welding 1974 & 1980
    Section 2 Welding Processes — Gas, Arc & Resistance 1975
    Section 3A Welding, Cutting & Related Processes 1976

Section 3B Welding, Cutting & Related Processes 1977
Section 4 Metals & Their Weldability 1978
Section 5 Applications of Welding 1979

16. Welding Technology — Giachino — Weeks — Johnson — 2nd Edition American Technical Society — Chicago, Illinois Student Guide and Instructor Answer Key Available

B. Booklets and Pamphlets:
   1. "Aids to Excellent Machine Design in Welded Steel" — James F. Lincoln Arc Welding Foundation — Cleveland, Ohio 44117
   2. "Arc Welding — Basic Manual of Instruction" — James F. Lincoln Arc Welding Foundation — Cleveland, Ohio 44117
   3. "How to do TIG Welding" Linde Division, Union Carbide Corporation — 270 Park Ave., New York, N. Y. 10017
   4. "How to do Heliarc Welding of Pipe" — Linde Division — Union Carbide Corporation — 270 Park Ave. — New York, N. Y. 10017
   5. "Principles of Arc Welding" — Miller Electric Mfg. Co. Appleton, Wis.
   6. "Recommendations for Teaching Welding" — Hobart Brothers Technical School — Troy, Ohio 45373
   7. "Recommended Safe Practices in Welding & Cutting" — Airco Welding Products — 150 E. 42nd St. New York, N.Y.
   8. "Short Arc" — Linde Division — Union Carbide Corporation
   9. "Stoody Farm Hardsurfacing Handbook" Stoody Co. Whittier, Cal. 90608

C. Instruction and Study Guides:
   1. Arc Welding — Part 1 — Self Instruction Guide — Olson — Vector Publications, 1945 Sharondale Ave., St. Paul, Minn. 55113
   2. Arc Welding — Part 2 — Self Instruction Guide — Olson — Vector Publications, 1945 Sharondale Ave., St. Paul, Minn. 55113
   3. Arc Welding Teachers Guide — Self Instruction Guide — Olson — Vector
   4. Metals & Welding in Agriculture — Morford, Hoerner, Anderson — Hobar Publications — 1234 Tiller Lane, St. Paul, Minn. 55112
   5. Welding Skills & Practices — *Student Guide, Student Activity Manual*, and Instructors Answer Key — Giachino & Weeks — American Technical Society — Chicago, Illinois.

D. Films:
   The following are available from BAVI, University of Wisconsin, Madison
   1. "Arc Welding Methods" 8516
   2. "Arc Welding With CO_2" 4366
   3. "Beam of Energy" 1895
   4. "Fundamentals of Manual Shielded Arc Welding Techniques" Part I and Part II. 3979
   5. "Overhead Position Welding" 9086
   6. "Prevention and Control of Distortion in Arc Welding" 2665
   7. "Short Circuit Metal Transfer — A Gas Metal Arc Welding Process" 8308

WELDING, GAS

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Be familiar with current employment information, such as job descriptions, job availability, personal training requirements, working conditions, opportunity for advancement and other factors relative to potential employment in gas welding and will be able to relate these factors to his/her own specific needs and aspirations.
B. Select welding tips and make necessary regulator adjustments which are appropriate to the problems of repairing farm machines and equipment.
C. Understand the forces of distortions and shrink.
D. Perform all welding repair jobs on farm machinery and equipment.
E. Pass a certification test on structural steel for all welding positions.
F. Pass a certification test in pipe welding in any axis.
G. Perform jobs in any fabricating shop and after two weeks of on-the-job instruction, pass whatever certification test is necessary to comply with the welding code and requirements.
H. Pass a pipe welding test using oxy-acetylene to weld small diameter pipe to meet code requirements.
I. Construct special equipment to meet farm needs, or construction needs in industry.

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J. Understand and use safe operating practices and procedures.
K. Secure a neutral, carburizing and oxidizing flame and know under what conditions each is used.
L. Perform fusion welding of mild steel in the flat position and master skills in running a bead, weld a lap joint, a corner joint and an edge or flange joint.
M. Understand the conditions under which brazing is used.
N. Comprehend the principles of brazing.
O. Braze all of the joints listed in L above.
P. Braze a small hole or braze weld a patch on a larger hole.
Q. Perform hard facing jobs to protect equipment from excess wear by abrasion.
R. Discuss joint designs; prepare and weld joints to obtain maximum strength.
S. Select base metals which can be brazed.
T. Use techniques which minimize the forces of stress.
U. Explain the characteristics of brazing filler metals.
V. Understand the purpose and use of brazing flux.
W. Grasp the importance of pre-cleaning and surface preparation.
X. Braze gray cast iron, malleable cast iron, ductile iron, low carbon and low alloy steel, high speed tool steel, stainless steel, nickel and nickel alloys, copper and copper alloys, magnesium and magnesium alloys.
Y. Perform and explain post-braze treatment.
Z. Understand the importance of removing flux.
AA. Properly tin an entire Vee and on multiple passes obtain complete fusion between the new deposit and previously deposited layers of bronze.
BB. Cut metals of various thicknesses with the oxy-acetylene torch.
CC. Define the terms "drag" and "kerf."
DD. Cut a piece of steel one inch thick.
EE. Understand what effect the cutting process has on the hardening of steel.
FF. Recognize and explain the problems associated with the cutting of metals.
GG. Demonstrate ability with the cutting torch to perform an exercise in scarfing, gouging and grooving.

II. Concepts to Develop

A. There are career opportunities in gas welding for young men and women at all levels of eduactional preparation.
B. A constant awareness of safety is needed by all persons at all times.
C. Rewards in the welding industry are commensurate with the level of skill attained and his/her willingness to work.
D. Continual upgrading in related subject areas and in skill development may be accomplished by enrolling in evening classes or in correspondence courses.
E. The attainment of a high level of proficiency contributes significantly to his/her self image.
F. Distortion and shrink can be effectively controlled by a skilled welder.
G. A welder must be certified before being employed on some construction projects.
H. Certain metals and their alloys require a special welding process.
I. Special techniques are utilized when welding various joints in different positions.
J. A person possessing a high level of welding skill can command an excellent salary.

III. Subject Matter to Teach

A. Careers
  1. Current and future employment needs.
  2. Job descriptions.
  3. Training requirements.
  4. Working conditions.
  5. Opportunity for advancement.
  6. Other factors relating to student needs and aspirations.

B. Safety
  1. Clothing and shields.
  2. Eye protection.
  3. Safeguarding others.
  4. Handling fuel and oxygen containers.
  5. Remove combustibles from pockets.
  6. Materials used for welding supports.
  7. Welding or cutting tanks and containers.
  8. Checking for leaks.
  9. Opening of oxygen valves.
  10. Purging oxygen valves, lines and equipment.
  11. Support of gas cylinders.
  12. Identification of cylinders.
  13. Storage of empty and full cylinders.
  14. Care of regulators.
  15. Do not lay down a lighted torch.
  16. Lighting the torch.
  17. Blowing out acetylene valves.
  18. Attaching regulators to the tanks.
  19. Hose fittings.
  20. Protection and inspection of hoses.

  21. Follow maunufacturer's recommendations.
  22. Backflash arrestors in line at torch or regulator.
C. Identification of iron and steel
  1. Spark test.
  2. Oxy-acetylene torch test.
  3. Fracture test.
  4. Color test.
  5. Ring or sound test.
  6. Magnetic test.
  7. Chip test.
D. Identification of non-ferrous metals
  1. Color.
  2. Hardness.
E. Properties of the gases
  1. Oxygen.
  2. Acetylene.
  3. Mixture of oxygen and acetylene.
F. Flame adjustment
  1. Lighting the torch.
  2. Neutral flame.
  3. Carburizing flame.
  4. Oxidizing flame.
  5. Cutting torch adjustment.
G. Tip selection and care
  1. Designation of sizes.
  2. Procedure for cleaning.
  3. Criteria for tip selection.
H. Brazing
  1. Principles of brazing.
  2. Conditions for use.
  3. Preparation and design of joints for maximum strength.
  4. Selection of base metals which can be brazed.
  5. Use of filler metals, conditions and techniques in their use.
  6. Preparation of joints and brazing techniques to use in minimizing stress.
  7. Characteristics of brazing filler metals.
  8. Purpose and use of brazing fluxes.
  9. Purpose and importance of pre-cleaning and surface preparation.
  10. Post-braze treatment.
  11. The importance of flux removal.
I. Cutting with the oxy-acetylene unit
  1. Principles of the cutting preparation.
  2. Define the terms "drag" and "kerf".
  3. Regulator pressures for cutting steel up to 1“ thick.
  4. Advantages and disadvantages of acetylene, natural gas and propane.
  5. Effect of the cutting process on steel hardening.
  6. The effect alloying elements have on the resistance of steel to oxygen cutting.
  7. Conditions necessary for heavy cutting.
  8. Basic types of cutting torches.
J. Skill Development
  1. Fusion welding of mild steel in the flat position
    a. Run beads on a ⅓' steel strip.
    b. Weld a lap joint.
    c. Weld a flush corner joint, a half open corner joint, and a full open corner joint.
    d. Weld a butt joint securing complete fusion and penetration.
    e. Weld a "T" joint.
    f. Weld an edge or flange joint on light material.
  2. Brazing
    a. Use ⅛' strips or sheet metal and braze a lap joint, corner joint, butt joint, "T" joint and an edge or flange joint.
    b. Braze a small hole in a pail.
    c. Braze weld a patch on a larger hole.
    d. Braze other metals and alloys.
      1) Gray cast iron.
      2.) Malleable cast iron.
      3) Ductile cast iron.
      4) Low carbon and low alloy steel.
      5) High carbon steel.
      6) High speed tool steel.
      7) Stainless steels.
      8) Nickel and nickel alloys.
      9) Copper and copper alloys.
      10) Aluminum and aluminum alloys.
      11) Magnesium and magnesium alloys.
      12) Proper tinning of the entire vee, and on multiple passes, obtain fusion between the new deposit and previously deposited layers of bronze.
  3. Cutting with the oxy-acetylene torch.
    a. Cut a steel plate up to one inch thick.
    b. Scarfing.
    c. Gouging.
    d. Grooving.

4. Welding in the vertical up position
    a. Run beads in vertical up position and adding filler rod from the top.
    b. Weld a butt joint.
    c. Weld a lap joint.
    d. Weld a "T"joint.
5. Welding in the horizontal position
    a. Run beads in the horizontal position.
    b. Weld a butt joint.
    c. Weld a lap joint.
    d. Weld a "T" joint.
6. Hard surfacing metals
    a. Plowshares.
    b. Cultivator shovels.
    c. Tractor chains.

K. Project activities
1. Repair of equipment.
2. Project construction.
3. Blueprint reading.

IV. Motivation

A. Films, filmstrips and slides.
B. Charts.
C. Bulletin board displays.
D. Field trip to welding repair shops.
E. Field trip to construction site to view welders on the job.
F. Field trip to industrial firm to view factory type welding jobs.

V. Learning Activities

A. Occupational experience program.
B. Run beads.
C. Weld metals of varying thicknesses in the flat, horizontal and vertical position.
D. Repair machinery and equipment.
E. Construct projects.
F. Identify common metals.
G. Weld pipe in any axis.
H. Braze a lap joint, a corner joint, a "T" joint and an edge or flange joint.
I. Braze a small hole or braze weld a patch on a larger hole.
J. Apply hard facing metal to various parts of equipment.
K. Complete brazing exercises on gray cast iron, malleable cast iron, ductile cast iron, low carbon and low aloy steel, high speed tool steel, stainless steel, nickel and nickel alloys, copper and copper alloys, magnesium and magnesium alloys.
L. Cut metals with the oxy-acetylene torch.
M. Complete scarfing, gouging and grooving exercises.
N. Lengthen drill bits by adding desired length by brazing.
O. Repair kitchen chairs by brazing.

VI. Materials Needed

A. Books:
1. Farm Mechanics Text and Handbook - Phipps - Interstate
2. Mechanics in Agriculture - Phipps - Interstate - 1967
3. Metals Handbook - 8th Edition - Volume 6 - Welding & Brazing - American Society for Metals, Metals Park, Ohio 44073
4. Modern Agricultural Mechanics - Wakeman - Interstate - 1977
5. Modern Welding - Althouse, et al - Goodheart-Willcox
6. The Farm Shop - Wakeman & McCoy - Macmillan Co. New York - 1960
7. The Oxyacetylene Handbook, Linde Division, Union Carbide Corporation, 270 Park Avenue, New York, N. Y. 10017 - 1976
8. The Oxyacetylene Welders' Handbook - Jefferson - Monticello Books - Morton Grove, Illinois
9. The Welding Encyclopedia - 17th Edition - Jefferson - Monticello Books
10. The Welding & Cutting Manual - Linde Division - Union Carbide Corp.
11. Welding Handbook - 6th Edition - American Welding Society - 2501 N. W. 7th St., Miami, Florida 33125
    Section 1 Fundamentals of Welding 1974 & 1980
    Section 2 Welding processes - Gas, Arc & Resistance - 1975
    Section 3A Welding, Cutting & Related Processes - 1976
    Section 3B Welding, Cutting & Related Processes - 1977
    Section 4 Metals & Their Weldability 1978
    Section 5 Applications of Welding 1979

B. Bulletins & Pamphlets:
1. "Fundamentals of Silver Brazing" - Bulletin 666 - Harmon & Handy - 850 Third Ave. - New York, N.Y. 10022
2. "Instruction Manual & Catalogue" - All-State - Alloy Rods Division - Chemetron Corporation, Hanover, Pa. 17331
3. "Linde-Gases & Welding Products" - Union Carbide Corporation New York

4. "Oxyacetylene Welding and Cutting for the Beginner" - Linde Division - Union Carbide Corporation - 270 Park Ave. - New York, N.Y. 10017
5. "Precautions and Safe Practices for Welding and Cutting" Form 52529 Linde Division - Union Carbide Corporation
6. "Safety in Welding & Cutting - AN 51Z49.1 - American Welding Society - 2501 N. W. 7th St. Miami, Florida 33125
7. "Stellite Hard Facing Products - Stellite Division - Cabot Corporation - 1020 W. Park Ave., Kokomo, Indiana 46901
8. "The Brazing Book" - Harmon & Handy - 850 Third Ave., New York, N.Y.

D. Films: BAVI - University of Wisconsin
1. Manual Cutting a Bevel - Freehand 9132
2. Manual Cutting a Shape - Freehand Guided 9133
3. Manual Cutting to a Line - Freehand 9131
4. Welding Operator 2402

E. Slide Films or Slide Sets -
Oxyacetylene Series - Vo-Ag Service, College of Agriculture, University of Illinois, 434 Mumford Hall, Urbana, Illinois
1. Aluminum Welding
2. Bronze Welding
3. Equipment Maintenance
4. Equipment Safe Practices
5. Equipment - Setting Up
6. Fusion Welding Steel
7. Hardfacing
8. Lighting & Adjusting the Flame
9. Manual & Machine Cutting
10. Silver Brazing
11. Using Powder Braze Torch
12. Equipment & Processes

F. Film Strips -
1. Oxyacetylene Welding - Setting up Equipment & Lighting the Torch
2. Oxyacetylene Welding - Flat Position Welds
From Vocational Education Productions - California State Polytechnical College - San Luis Obispo, California - 93401

WISCONSIN JUNIOR DAIRYMEN'S ASSOCIATION

I. Performance Objectives

Upon completion of this unit the student will be able to:

A. Explain the aims and purposes of the Wisconsin Junior Dairymen's Association.
B. Discuss the requirements for membership in the association.
C. Describe activities conducted at the local, district and state level.
D. Be familiar with the constitution and by-laws of the organization.
E. Comprehend the many opportunities for leadership development afforded by the association.
F. Analyze the records kept on the home herd or an example set of records developed by the instructor.
G. Describe the official dress of the organization.
H. List the official colors.
I. Describe all of the events which take place at the state dairy show.
J. Understand the importance of testing the home herd.
K. Be familiar with the DHI program.

II. Concepts to Develop

A. Recognized procedures for animal and record evaluation contribute significantly to the herd building program.
B. The analysis of dairy production records provides useful information for determining which cows should be culled.
C. Herd testing and record keeping through your local DHI program is the most beneficial method of herd analysis.
D. Thousands of young men and women have progressed from their high school DHI programs into successful young farmers.
E. The WJDA has provided a means for high school dairymen and young farmers to gain recognition for their achievement in improving the dairy herds of Wisconsin.
F. The WJDA provides many leadership opportunities for its members.
G. The dairy cow exposition is the only one of its kind in the nation.
H. The WJDA provides numerous opportunities for young men and women to improve their communication skills.

III. Subject Matter to Teach

A. Historical development to the Wisconsin Junior Dairymen's Association.
   1. Need for an association.
   2. Early developments of the organization.
   3. Governing structure.

B. Requirements for membership.
   1. Dues.
   2. Involvement in herd testing and analysis of work.
   3. Age.

C. Membership objectives.
   1. Specific student interest activities.
   2. Development of skills valuable to a dairyman.
   3. Advancement of the dairy industry.
   4. Leadership development.
   5. Practical knowledge of dairy records.

D. Qualifications for a director.
   1. Occupational Experience Program.
   2. Scholastic ability.
   3. Ability to conduct a meeting.

E. Local activities of the WJDA chapter.
   1. Program of work.
   2. Fieldtrips and guest speakers.
   3. Contest involvement.
   4. Money raising activities.

F. District activities of the WJDA
   1. Demonstration contest.
   2. Extemporaneous speaking contest.
   3. Election of district director.
   4. Nomination of a candidate for director-at-large.
   5. Selection of a candidate for the Outstanding Junior Dairyman's award.
   6. Discussion of state issues which are to be voted on at the state WJDA convention.

G. State activities of the WJDA
   1. Demonstration Contest.
   2. Extemporaneous Speaking Contest.
   3. Election of Two Directors at Large.
   4. Selection of the Outstanding Junior Dairyman's Award.
   5. ADA Scholarship.
   6. Milk Marketing Contest.
   7. Efficient Milk Production Contest.
   8. Sire Selection Contest.
   9. Production Awards.
   10. Herdsmanship Award.
   11. Classification Contest.
   12. The Dairy Show.
   13. Sweepstakes Award.
   14. Tenure Award.

H. Awareness of special advantages.
   1. Scholarships.
   2. Dairy show premiums and trophies.
   3. Opportunities to meet state dairy leaders.
   4. Unique educational opportunities.

I. Mechanics of keeping production records
   1. Record keeping plans.
   2. Cooperative Plans involving the local DHIA
   3. Methods of testing.
   4. Identification is a must.
   5. Procedures for collecting milk samples.

J. How records are computed

K. Why milk tests vary
   1. Breed
   2. Stage of lacation
   3. Condition.
   4. Completeness of milking
   5. Heat period
   6. Interval between milkings
   7. Weather or season
   8. Age
   9. Health
   10. Ration
   11. Differences from plant test.

L. Use of Records throughout the year.
   1. Feeding.
   2. Breeding.
   3. Sire selection.
   4. Cows to be dried off.
   5. Cows which have freshened since the last test.
   6. Cows to be culled.
   7. Heifers entering the herd.
   8. Changes in rolling herd averages from month to month.

M. Yearly herd analysis
   1. Evaluation of herd performance.
   2. Performance of each individual cow.
   3. Sire evaluation

IV. Motivation

A. Display trophies and awards.
B. State WJDA officers speak to vocational agriculture classes.
C. Attend district meetings.
D. Attend state WJDA convention.
E. Slides of local and state JDA activities.
F. Encourage students to compete in district and state activities by running local contests.

V. Learning Activities

- A. Complete DHI monthly worksheet.
- B. Complete production reports.
- C. Participate in milk marketing contest.
- D. Deliver an extemporaneous speech.
- E. Participate in demonstration contest.
- F. Participate in sire selection contest.
- G. Participate in the classification contest.
- H. Exhibit a cow at the state dairy show.
- I. Be a contestant for the Junior Dairyman Award.
- J. Serve as an officer of the local or state association.
- K. Tour local DHI testing lab.
- L. Guest speaker from DHIA testing lab.

VI. Materials Needed

- A. Books
  1. *Dairy Herd Improvement Handbook,* (revised 1973) National Book Co.
  2. *Dairy Cattle: Principles, Practices, Problems, Profits,* Foley, Bath, Dickinson, Tucker; 1972 Lea & Febiger Philadelphia.
  3. *Livestock Judging, Selection and Evaluation* Norby et al, 1978.
- B. WJDA Newsletter, Available from Clara Hedrich, WJDA Executive Secretary, Chilton, Wisconsin.
- C. Periodicals
  1. Hoards Dairyman
  2. Successful Farmer
  3. Wisconsin Agriculturalist
  4. Wisconsin Dairy Facts.
- D. Newspapers
  1. Wisconsin State Farmer
- E. Films and slides
  1. "Dairy Herd Improvement," 4341, BAVI, University of Wisconsin-Madison.
  2. "Electronic DHIA Records." Available for purchase and in special situations for rental from Dr. Clarence Olson, Dairy Science Department, University o Wisconsin-Madison 53706.
  3. "The Wisconsin Junior Dairymen," available from Clara Hedrich, Chilton High School, Chilton, WI.
- F. Educational Resources
  1. DHI center
  2. UW-Extension
  3. USDA-Dairy Breeds
  4. AI Bull Studs.

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DIRECTORY OF PUBLISHERS

AAVIM
American Association for Vocational Instructional Materials, Engineering Center, Athens, Georgia 30602.

A & L
A & L Publications. Station A, Box F, Champaign, Illinois 61820.

AMERICAN FORESTRY
American Forestry Association. 919 17th Street, N. W., Washington, D. C. 20006.

American Oil
American Oil Company, 910 S. Michigan Avenue, Chicago, Illinois 60680.

American Poultry
American Poultry & Hatchery Foundation. 521 East 63rd Street, Kansas City, Missouri 64110.

Arco
Arco Publishing Company. 219 Park Avenue South, New York, New York 10003.

Avi
Avi Publishing Company. Box 831, Westport, Connecticut 06880.

Barnes
A. S. Barnes & Company, Inc. Cranbury, New Jersey 08512.

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William C. Brown Company, Publishers. 135 South Locust Street, Dubuque, Iowa 52001.

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Bruce Publishing Company. 400 No. Broadway, Milwaukee, Wisconsin 53201.

Caxton
Caxton Printers, Ltd. 312 Main Street, Box 700, Caldwell, Idaho 83605.

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Cooperative League. 59 East Van Buren Street, Chicago, Illinois 60605.

Crown
Crown Publishers, 419 Park Avenue, South, New York, New York 10016.

David McKay
David McKay Company, Inc. 750 Third Avenue, New York, New York 10016.

Doane Agricultural Service
Doane Agricultural Service, Inc. 8900 Manchester Road, St. Louis, Missouri 63144

Doubleday
Doubleday & Company. 501 Franklin Avenue, Garden City, New York 11530.

Farm Quarterly
Farm Quarterly. 22 E. 12th Street, Cincinnati, Ohio 45210

Fearon
Fearon Publishers. Educational Division. Lear Siegler, Inc., 6 Davis Drive, Belmont, California. 94002.

Freeman
Freeman Press. 660 Market Street, San Francisco, California 94104.

Future Farmers of America — FFA
National FFA Center. Alexandria, Virginia. 22309.

Goodheart-Willcox
Goodheart-Willcox Company. 1250 Harwood, Homewood, Illinois 60430.

Grosset & Dunlap
Grosset & Dunlap, Inc. 51 Madison Avenue, New York, New York 10010.

Harper & Row
Harper & Row Publishers. 10 East 53 Street, New York, New York 10022.

Heath
D. C. Heath & Company. College Department, 125 Spring Street, Lexington, Massachusetts 02173.

Hobar
Hobar Publications. 1305 Tiller Lane, St. Paul, Minnesota 55512.

Interstate
The Interstate Printers and Publishers, Inc. Jackson at Van Buren, Danville, Illinois 61832.

Iowa State University
Iowa State University Press. Press Building, Ames, Iowa 50010.

Irwin
Irwin Company. 1818 Ridge Road, Homewood, Illinois 60430.

Lea & Febiger
Lea & Febiger, Publishers. 600 Washington Square, Philadelphia, Penn. 19106.

Linde
Linde Division. Union Carbide Corporation. 270 Park Avenue, New York, New York 10017.

Lippincott
J. B. Lippincott Company. East Washington Square, Philadelphia, Penn. 19106.

Little, Brown
Little, Brown and Company, Publishers. 34 Beacon Street, Boston, Mass. 02106.

McGraw-Hill
McGraw-Hill Book Company. 5940 Touhy Avenue, Niles, Illinois 60648.

McKnight
McKnight and McKnight, Publishers. Bloomington, Illinois 61702.

Macmillan
Macmillan Company, Publishers. 866 Third Avenue, New York, New York 10022.

Meredith
Meredith Corporation. — Better Homes and Gardens. 1716 Locust Street, Des Moines, Iowa 50336.

Merrill
Charles E. Merrill Publishing Company. Division of Bell & Howell Company, 1300 Alum Creek Drive, Columbus, Ohio 43216.

Morrison
Morrison Publishing Company. 515 Woodlands Drive, Clinton, Iowa 52732.

National Farm Book Company
National Farm Book Company, Omro, Wisconsin 54963.

National Plant Food Institute
National Plant Food Institute. 1700 K. Street, Washington, D. C. 20006.

Ohio Vo-Ag Instructional Materials Service
Ohio Vocational Agriculture Instructional Materials Service. 2120 Fyffe Road, Columbus, Ohio 43210.

Pegasus
c/o Bobbs-Merrill Company., Inc. 4300 W. 62 Street, Indianapolis, Indiana 46268.

Prentice-Hall
Prentice-Hall Inc. Educational Book Division, Englewood Cliffs, New Jersey 07632.

Ronald Press
Ronald Press Company. 15 East 26th Street, New York, New York 10016.

Sams
Howard W. Sams & Company. Subs. of ITT, 4300 62nd Street, Indianapolis, Indiana 46268.

Stipes
Stipes Publishing Company, Champaign, Illinois 61820.

Superintendent of Documents
Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

Technical Publications
Technical Publications, Inc. 10114 Wyandotte Street, Kansas City, Missouri 64150.

University of Illinois
University of Illinois. 123 Mumford Hall, Urbana, Illinois 61801.

University of Wisconsin-Extension
University of Wisconsin-Extension. Agricultural Bulletin Room, 1535 Observatory Drive, Madison, Wisconsin 53706.

Vector
Vector Publications. 1945 Sharondale Avenue, St. Paul, Minnesota 55113.

Van Nostrand
D. Van Nostrand Company. 120 Alexander Street, Princeton, New Jersey 08540.

VEP
Vocational Education Productions. California State Polytechnic College, San Luis Obispo, Califo
93407.

Wadsworth
Wadsworth Publishing Company, Inc. Belmont, California 94002.

Watts
Franklin Watts, Inc. 834 Third Avenue, New York, New York 10022.

WAVAI
Wisconsin Association of Vocational Agriculture Instructors. Russell Weinsensel 2117 Sherman Av
nue, Madison, Wisconsin. 53704.

Webb
Webb Book Publishing Company, 1999 Shepard Rd., St. Paul, Minnesota 55116.

Wiley & Sons
John Wiley & Sons., Inc. 605 Third Aveue, New York, New York 10016.

Windsor
Windsor Press. Box 280, Brightwaters, New York 11718.

Wisconsin Electric Cooperative
Wisconsin Electric Cooperative. 1819 South Park Street, Madison, Wisconsin 53713.

VISUAL AIDS

Bureau of Audio-Visual Instruction — BAVI
Bureau of Audio Visual Instruction, P. O. Box 2093, 1327 University Avenue, Madison, Wisconsin
53701.

Farm Film Foundation
Farm Film Foundation. 1425 H. Street, N. W., Washington, D. C. 53202.

Modern Talking Pictures
Modern Talking Picture Service. 1696 N. Astor Street, Milwaukee, Wisconsin 53202.

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